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ENDOCRINOLOGIA: PATOLOGIA E CLINICA DELLE GLANDOLE A SECREZIONE INTERNA (Endocrinology: Pathology and Clinical Aspects of the Glands of Internal Secretion). 3D EDITION, VALLARDI, MILAN.

PATOLOGIA DEL SIMPATICO (Pathology of the Sympathetic Nervous System) (CASTELLINO-PENDE). VALLARDI, MILAN, 1915.

LE DEBOLEZZE DI COSTITUZIONE (Constitutional Inadequacies). 2 VOLS. 2D EDITION. BARDI, ROME, 1927.

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CONSTITUTIONAL INADEQUACIES

AN INTRODUCTION TO THE STUDY OF ABNORMAL CONSTITUTIONS

BY

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FOREWORD.

THERE is a peculiar quality of the human mind, reminiscent of the rim of a wheel moving slowly onward through deep sand which covers a segment of its circumference. For if one reviews the history of thought in any field of endeavor, the truth of that old saying, "history repeats itself," is quite apparent. Yet beyond this one may perceive the striking fact that simple repetition does not fully explain the remarkable growth of man's understanding. As the rising curve of the wheel emerges from the sand and swings upward and forward into the sunshine, the adherent dusty particles of the roadbed are illuminated and cast new light upon the path ahead. Such is the reciprocally energizing effect of ever-leaping modern thought, and the reposeful quiescence of ancient beliefs. Perhaps, if we accept the teaching of biology that the ovum is quiescent and bespeaks anabolism, ideas, settling down with the passage of time, become female and require impregnation by the vigorous mental activity of the living moment. And so, after all, new knowledge may be merely the offspring of a marriage between past and present.

When in 1880 Achille De Giovanni began to emphasize the importance of studying the constitution and personality of sick people, as well as their diseases, he reawakened clinicians to a consideration of one of their most obscure and significant problems. His work, inspired at many points by the great German anatomist, Beneke, was also reminiscent of implications to be found in the writings of Hippocrates and Galen, and of Elsoholtzius, who held the chair of medicine at Padua in 1650. De Giovanni, however, recognizing the inadequacy of vague impressions, seized upon the technique of the new science of physical anthropology and applied it to the clinic. He thus became not only himself a profound student of human beings, but established the Italian school of clinical anthropology. The seed of his teachings fell upon fertile soil and was developed by his brilliant pupil Viola, now Professor of Medicine at Bologna. Following in direct line, a pupil of Viola's, Nicola Pende, at present

Professor of Medicine at the Royal University of Genoa, now appears as the distinguished author of this book.

The synthetic quality of Pende's philosophy of clinical medicine is epitomized in the aphorism which he has caused to be inscribed high on the wall above the rostrum of his clinic auditorium:

> **L'anatomia e la fisiologia spartono gli organi; la clinica li riunisce. (Anatomy and physiology separate the organs; the clinic reunites them.)**

In order to carry out this function of the clinic, Professor Pende has been developing within his department of medicine a most effective unit for the study of the human constitution. The scale and completeness with which this "Istituto Biotipologico" is conducted surpass anything of the kind elsewhere. So valuable is the work of this institute considered to be that it receives support both from municipal and state educational and public health funds.

It will be quite apparent to the reader of this book that Pende has exhibited again that extraordinary capacity of the Italian savants to combine effectively, as did Leonardo in his matchless anatomical drawings, the detailed accuracy of the scientist with the perception and feeling of the artist. With his background of rich clinical and endocrinological experience he has presented a wealth of fine observation, and has advanced stimulating hypotheses for the explanation of those mechanisms which determine the appearance of the micro- and megalo-splanchnic forms of Viola. There is, of course, nowadays a strong effort among endocrinologists to explain the human constitution entirely on the basis of glandular activity. Whether or not this thesis will stand the test of time remains to be seen. The present volume, to be sure, emphasizes the great influence which hormones exert, and at times definitely places the responsibility for certain constitutional characters upon one or more of the ductless glands. But the difficult and obscure subject has been presented in a direct and interesting fashion, and with a fine assurance. The conscientiousness, thoroughness, energy and perspicacity which Professor Pende, as a pupil of his great masters, De Giovanni and Viola, has put into his own efforts in the field of the human constitution, are reflected in this monumental work which marks him as an outstanding leader in this domain of medical research.

George Draper, M.D.

New York.

AUTHOR'S PREFACE.

The systematic study of the constitution, of the personality of the patient, or, to adopt Viola's well-chosen expression, the *science of the individual*, which I propose to call *human biotypology*, is now generally admitted in Italy, as elsewhere, to be an indispensable premise for the complete understanding of clinical problems. A fact which deserves mention, however, is that prior to the acceptance of this theory a broad-minded and brilliant Italian clinician, Achille De Giovanni, had for many years attacked the communistic régime which prevailed in medicine, under which the individual characteristics of the patient were ignored, and only the general etiological, pathogenetic and therapeutic laws, derived from bacteriology and revealed in the laboratory, were considered of value in the analysis of disease. Now, however, we have reached a point of such out-and-out *individualism* or *personalism* that it is difficult for the well-balanced mind to hold an exact eclectic course between the late *exogenism* and the modern *endogenism*.

The facts accumulated in this rich field of study by the school of De Giovanni (as by the old French clinical school, starting with Rostan and continuing right up to Bouchard, Sigaud and their pupils) are receiving daily confirmation in the numerous monographs on constitutional pathology that are being published at the present time in scientific Germany.

I have been requested by the scholarly publisher Bardi of Rome to write a brief monograph upon the present-day status of clinical medicine, and for the sake of the practising physician I have thought it of value to devote myself to this very subject of constitutional anomalies and inadequacies, in the hope of making known in Italy and elsewhere the investigations of our constitutional school.

May this modest attempt of mine be the incentive for another more complete and authoritative essay on the part of one more worthy than myself!

Nicola Pende.

TRANSLATOR'S PREFACE.

The endogenous factors of disease are gradually attracting the attention of medical men, whose interest was directed almost entirely toward the external factors (germs, traumata, etc.) up to the beginning of this century. The new movement has been particularly active during the last twenty-five years, *i. e.*, it has proceeded *pari passu* with the progress made in the studies on heredity and endocrinology. Today the hippocratic system is gradually resuming its old position, as is evidenced by the individualistic trend which medicine is assuming more and more every day.

It is because in this country constitutional problems have not been given adequate importance, in comparison with the attention paid them in Europe (especially in Italy, Germany and Austria), that I have thought it worth while to translate the present volume which embodies, in a concise but complete form, the fundamental problems of the constitution.

The author of this book is well known in the scientific world for his manifold contributions to endocrinology and constitutional pathology. His wide range of information in clinical medicine adds to his qualifications for the treatment of such an important subject.

The translator, in presenting this book, has had in mind not only those who are interested in disease, but also the psychologists, who will acquire from its study invaluable data for a better understanding of the original nature of man. The knowledge of the constitutional potentialities leading to abnormal behavior is certainly a very important source of information whenever individual differences are to be considered. For the practising physician this book is of particular interest, inasmuch as the study of constitutional inadequacies will not only help in the diagnosis and prognosis but will also supply practical criteria for a successful therapy.

SANTE NACCARATI, M.D.

CONTENTS.

Foreword v
Author's Preface vii
Translator's Preface ix

PART I.

GENERAL CONCEPTS.

CHAPTER I.

Definition of Constitution, Constitutional Anomaly and Constitutional Disease.

Difficulty of defining constitution—Viola's concept—The correlational principle derived from the ancients—Constitution more than the sum total of its parts—The modern unitary concept—Constitution greater than individual disposition—Definition—Tandler's idea untenable—Constitution derived both from heredity and environmental reaction—Cellular and humoral elements involved—The individual biotype—Constitutional anomaly and constitutional disease defined—Variant *vs.* anomaly—Diathesis and constitution 17– 31

CHAPTER II.

Concept of Constitutional Strength and Weakness.

Viola's ontogenetic principle—The relations of the vegetative and the animal system—Viola's anthropometric procedure—The fundamental criteria for the judgment of constitution—Distinction of two great ectypes—Brachymorphic and dolichomorphic constitutions—Their relation to anabolic and catabolic functions—Difference between normal and healthy individuals—Necessity for a clinical as well as an anthropometric criterion 32– 55

CHAPTER III.

Semiological Analysis of Constitution and Criteria for the Classification of the Individual Biotypes.

Three aspects of constitution: morphological, dynamic-humoral, psychological—The morphological criterion—Local ectypes based on the proportional development of the four principal organic systems—Hyperevolute and hypoevolute types—Brugsch's index—Autochthonous characteristics of the four systems—The dynamic-humoral criterion (neurochemical): the endocrine dominant—Viola's microsplanchnic and megalosplanchnic types in relation to the endocrine formula—Two great hormonic groups—Vegetative and animal neurotonus—Pharmacodynamic tests—The sympathetic an excitocatabolic system, the parasympathetic an excitoanabolic—The psychological criterion—The instinctive-affective and intellective-volitive types—Schizoid and cycloid temperaments—Correlations between soma and psyche—Variants of the two great ectypes 56– 83

CHAPTER IV.

PRINCIPAL ECTYPES OF GENERAL CONSTITUTION.

Earlier classifications—French and German schools—The megalosplanchnic hypervegetative constitution: Synonyms—Description—Endocrine varieties and subgroups—Relation to bradytrophism—Morphological hypoevolution, its fundamental determining principle—Lymphatism—Exudative diathesis—Arthritism—Constitutional vagotonia—Carcinomatous tendency—The microsplanchnic hypovegetative constitution: Synonyms—Description of pure type and endocrine variants—Predisposition to pulmonary tuberculosis—Sympathicotonia and vagotonia—Tendency to erethism and tachypragia—Pathological dispositions—Degenerative states—Endocrine anomalies—Infantilism—Dwarfism—Gigantism . . . 84–128

PART II.

LOCALIZED CONSTITUTIONAL ANOMALIES AND INADEQUACIES.

INTRODUCTION.

Necessity for analysis of local ectypes—Disease general, its manifestations always local—Why syndromes of the same general disease may differ in different individuals—Remarkable examples—Constitutional anomalies affecting given tissues—New classification not far distant 129–132

CHAPTER I.

CONSTITUTIONAL ANOMALIES AND CONSTITUTIONAL INADEQUACIES OF THE SKIN AND CUTANEOUS APPENDAGES.

Functions of the skin—Constitutional endocrinosympathetic imbalance — Pigmentation — Rutilism —Albinism—Premature aging—Characteristics of lymphatic skin—Tendency to periodic auto-infections—Reactivity to actinic rays—Individual differences in secretory activity—Hyperidrosis—Hair and nails—Constitutional variants of subcutaneous tissue—Adiposity 133–141

CHAPTER II.

CONSTITUTIONAL INADEQUACIES OF THE SKELETO-MUSCULAR SYSTEM.

Value of constitutional anomalies of the skeleton as an index of general constitutional anomaly—hands and feet of certain endocrine types—Anomalies of the head—Brittleness of bones in hypoevolute types—Anomalies of the spine—Teeth—Muscular deficiencies—Spasmophilia—Muscular asthenia in premature involution of the pineal gland—Modifications of muscular tonus 142–146

CHAPTER III.

Constitutional Anomalies of the Blood and of the Hemolymphopoietic Organs.

Constitutional erythrocytosis—Leukocytosis—Thrombocytosis—Erythropenia — Leukopenia — Thrombopenia — Lymphocytosis-mononucleosis in hypoendocrine conditions—Significance of lymphatic reaction—Eosinophilia—Is there a constitutional neutrophilia? Anomaly of hemohistioblasts perhaps responsible for pernicious anemia—Anomalies of the reticulo-endothelial apparatus—Icterus and hemolytic splenomegaly—Chlorosis—Constitutional hyperplasia of the lymphopoietic system 147–151

CHAPTER IV.

Constitutional Anomalies and Inadequacies of the Circulatory Apparatus.

Cardiovascular hypoevolutism—Cardiac infantilism—Instability of cardiac action—Drop-heart—The hypoplastic aorta—Hemorrhagic diathesis—Arteriosclerosis a constitutional inadequacy of arterial walls—Constitutional miopragia of the intima—Hypertonic diathesis—Angiotonic constitutions and hyperadrenalism—Familial constitutional hypertonia—Arteriocapillary fibrosis and hyperthyroidism—Anomalies of venous walls—Inadequacies of lymphatic circulation—Constitutional inadequacy possible without recognizable morphological changes—Idiopathic cardiac hypertrophy—Certain cardiovascular neuroses dependent on imbalance of sensory and motor nervous system of heart—Diminished resistance of cardiac tissues to toxins 152–159

CHAPTER V.

Constitutional Inadequacies of the Respiratory Apparatus.

Anomalies of nose and nasopharynx—Adenoidism—Its relation to tuberculosis—Association of adenoidism with anomalies of skeletal trophism—Dysgenetic coördination in growth of supermaxillary—Syndromes resulting from adenoidism—Adenoidism only one exponent of a degenerative soil—Dominance of parasympathetic tonus in adenoid subjects—Relation of laryngeal to sexual development—Strength or weakness of larynx an index of the general constitution—Anomalies of the bronchial tree—Exudative diathesis with stenotic tendency—Asthmogenic disposition due to imbalance of the endocrine-vegetative system—Parasympathetic predominance in recurrent respiratory catarrh—Substantial emphysema—Dolichomorphic tendency to pulmonary tuberculosis 160–170

CHAPTER VI.

Constitutional Inadequacies of the Digestive Apparatus and Its Accessory Glands.

Anomalies of tongue, teeth and salivary glands—Relation to instability of humoral balance—Esophageal stigmata of degeneration—The hypersthenic and the asthenic stomach—Tonus of gastric walls in megalosplanchnic and microsplanchnic subjects—Difference in amount of gastric juice—Shape of stomach—Functional anomalies of tonus and peristalsis, of secretion and sensibility—Peptic ulcer—Its relation to the asthenic microsplanchnic type—Secretory inadequacy—Gastric hypertonic and constitutional sympathicotonia—Anomalies of intestine—Its mucosa a mirror of the humoral balance—Hypoevolutism of appendix in lymphatic subjects—Appendicular irritability and endocrine constitution—Hemorrhoids frequent in lymphatic-arthritic conditions—Intestinal flora and constitution—Anomalous position of colon—Anomalies of liver, pancreas, spleen—Bilious temperament—Cholesterin diathesis in arthritics—Hemolytic icterus—Diabetes—Splenomegaly 171-189

CHAPTER VII.

Constitutional Anomalies and Inadequacies of the Urogenital Apparatus.

Constitutional albuminuria a degenerative stigma—Renal glycosuria without hyperglycemia—Anomaly of threshold of water elimination—Diabetes insipidus—Constitutional oliguria and polyuria—Lithic diathesis—Relation to hormones—Hereditary congenital renal inadequacy—Renal abiotrophy—Juvenile contracted kidney—Constitutional anomalies of the genital apparatus—Primary hypogenital type—Eunuchoidism—Incomplete and dissociated forms—Association with heterosexual tendencies—Dissociation of sexual instinct from function of internal genital secretion in certain hyperthyroid subjects—Evolutive anomalies of uterus and adnexa—Fecundity and constitution—Tumors due to constitutional imbalance of the endocrine system—Pure hypergenital type—Its association with hypothyroidism—Precocious matronism 190–208

CHAPTER VIII.

Constitutional Anomalies and Inadequacies of the Nervous System.

Neuropathic and psychopathic diathesis—Close association of the nervous and endocrine systems—Many nervous and psychic anomalies an ontogenetic hypoevolutism—Hyperevolutism present in some instances—Gowers' abiotrophy—Morphological signs of nervous infantilism—Atavistic manifestations—Heredo-degenerative and abiotrophic diseases—Predisposing constitutional anomalies—Glial diathesis—Primary endogenous sclerosis of nervous system—Idiopathic epilepsy—Degenerative stigmata in epileptics—Epileptoid character—Neuropsychasthenia—Relation to thyroid hormones—Difference of symptomatology in dolichomorphs and brachymorphs—Phthisic and apoplectic habitus 209–222

CHAPTER IX.

CONSTITUTIONAL ANOMALIES AND INADEQUACIES OF THE ENDOCRINE SYSTEM.

Their high place in modern constitutional pathology—Endocrine glandular diathesis hereditary—Sympathetic and endocrine systems a single apparatus—Familial endocrinopathies—Dysglandular heredity attacking different organs in progenitors and descendants—Findings of experimental pathology—Effect of maternal glands on fetus—Tuberculosis and syphilis—Importance of arthritic diathesis in the genesis of endocrinopathies—Their mode of manifestation in particular glands—Description of the various endocrine temperaments 223–235

CHAPTER X.

PRINCIPLES OF THERAPY OF CONSTITUTIONAL INADEQUACIES.

Social medicine *vs.* prophylactic care of the individual—Ideal somatic and psychic balance the aim of individual medicine—Is it possible to modify the hereditary side of constitution?—The value of stimulative therapy of organs—Reëducation and rational gymnastics The "educative moment" for an organ—The principle of functional economy—Protection from abnormal stimuli—Organotherapy—Endocrine hygiene—Treatment of criminal tendencies by acting on individual hormonic formula—Reconstructive tonics as endocrine regulators—Eugenics and prenatal care—The biotypogram, a somatic and psychic constitutional formula 236–242

CHAPTER XI.

APPENDIX TO ENGLISH EDITION. MODERN ANALYSIS OF THE INDIVIDUAL HUMAN BIOTYPE.

The biotype—Biotypology, the doctrine of constitutions, temperaments and characters—The correlational the only sound method of modern analysis—Lines of orientation—Morphological aspect: The absolute development of the bodily mass; the proportional development of the vegetative and animal system; the proportional development in length and breadth of the body; the tonus of the bodily form—Neurochemical aspect: Metabolic, endocrine and neurovegetative orientation; the energy of nervous reactions and of the functions of the various organs; velocity of functional reactions —Psychologic aspect: Energy or resistance of the various psychic functions; their velocity; development of the instinctive, affective and intellective life; special aptitudes; development of the total intelligence—Outline of the anabolic and the catabolic biotype—Analysis of the anabolic biotype on the basis of the greater hydrophilia of its colloids 243–245

GLOSSARY 249
AUTHORS' INDEX 253
GENERAL INDEX 257

CONSTITUTIONAL INADEQUACIES.

PART I.

GENERAL CONCEPTS.

CHAPTER I.

DEFINITION OF CONSTITUTION, CONSTITUTIONAL ANOMALY AND CONSTITUTIONAL DISEASE.

Difficulty of defining constitution—Viola's concept—The correlational principle derived from the ancients—Constitution more than the sum total of its parts—The modern unitary concept—Constitution greater than individual disposition—Definition—Tandler's idea untenable—Constitution derived both from heredity and environmental reaction—Cellular and humoral elements involved—The individual biotype—Constitutional anomaly and constitutional disease defined—Variant *vs.* anomaly—Diathesis and constitution.

It is somewhat difficult to define *constitution* at a time when the line of demarcation between biology and medicine compels us not only to pursue a purely descriptive or phenomenal study of constitutions but also to explore the very causation of these. As Viola has observed, the most perfect, broad and comprehensive view of the constitutional problem remains even today that which the French clinician Rostan expressed as far back as 1822 in these words:

"It is rare for a perfect balance to exist in all the systems of the animal economy. This complete harmony has perhaps never existed outside of the imagination of the ancients. One system nearly always appears to predominate over all the rest. Accordingly it is easy to conceive that the dominance of one apparatus should imprint an important modification upon our physical and moral constitution.

"In fact the various systems that we have recognized as entering into the make-up of the human body, and the fluids that form part of it, are not always found in such relation as to produce a perfect balance. Sometimes we have a predominance of the gastro-intestinal apparatus, and from this we have a particular type of organization. In other cases the respiratory and circulatory organs predominate, from which we again have a new constitution; or the apparatus of locomotion takes the lead, or the neural, or the reproductive, etc. We believe that it is this predominance of one or another system that gives its stamp to the various organic constitutions, which are as numerous as the systems themselves, and which differ according to their infinite possibilities of combination. This fact accounts sufficiently for the innumerable varieties of temperament which Nature offers us for observation."

This conception of *constitution*, which corresponds to the etymological meaning of the word (*cum* and *statuere*), is governed by what we may term a *correlational principle*, according to which the various combinations of organs and organic fluids and the special relationships or anatomical and functional correlations between the parts of the body which determine the different physical and mental constitutions vary according to the characteristics that are dominant in the interorganic equilibrium.

While this correlational principle in the essence of constitution is in accord with the entire trend of modern clinical medicine, with the principle of the vital unity of the human being founded upon the *consensus partium*, it is, nevertheless, derived directly from the constitutional concept of Hippocrates and Galen, by virtue of which the ancients considered the organism as a whole, whether in a state of illness or of health, to be characterized by a particular blending (in different proportions according to the various individuals) of the four fundamental humors. Hence the two terms and concepts of *constitution* and *temperament* are even now coupled together. The latter is still regarded as the dominant psycho-physiological note in a given individual, due to the predominance or deficiency of a function and, especially, of a humoral state, in the general dynamic balance, just as, in the constitution, the concept of the dominance of one special morphological disproportion in the general morphological balance has never been questioned.

For us, therefore, the constitution cannot mean simply the *sum total* of the individual characteristics of the separate organs and tissues of the body, as certain modern authors (Martius, J. Bauer, etc.) erroneously describe it. The constitution must be a *resultant*, a *synthesis*, a *quid novum* springing from reciprocal influence, from the coördination of the various parts and their respective functions by means of that mechanism of synthesis and vital unification which Leo Loeb terms the *individuality differential*.

Achille De Giovanni, the originator of the constitutional doctrine in Italy, has upheld this unitary concept of constitution for nearly half a century, and he is followed by the modern German school headed by F. Kraus; while Martius, another great leader of the constitutional system in Germany, has supported the *organic concept*. In other words, although he recognizes the importance, in the constitution, of the morphological and functional resultant of the correlation between the different parts, Martius lays great stress upon the value of what he terms the *partial constitutions* of the organs, namely, the conformation and the original physiological, so to speak autochthonous, attitudes of the separate organs and apparatus. According to Martius and his followers, it is from the sum of these local characteristics that the type of the general constitution of the individual can be determined.

As usual, the truth lies between these concepts, so that even in the *organic* concept of Martius we, followers of the ancient unitary constitutional trend, find a theoretical and practical foundation which we cannot and must not overlook.

In determining the final style of a building, especially its solidity, its advantages and disadvantages according to the purposes it is to serve, we must give attention not only to the value of the architectural plan, but also to the material used in construction, since the material is not uniform throughout all parts of the building, and the structure itself may for this reason prove to be less solid as a whole. Just so, in determining the special type of the bodily makeup in different individuals and its degree of orientation and functional capacity, it is important not only that there shall be a more or less perfect coördination of all the parts (according to a given original plan determined essentially by heredity), but also that the quality of the raw material from which each part is formed shall harmonize with the final finished product. For we must accept *a priori* the fact that the same mechanisms that establish the *consensus partium* demand, in order to act, that all the parts be able, according to their degree of intrinsic autochthonous reactivity, to respond to the neuro-chemical coördinating stimuli (page 64).

Accordingly, in judging of constitution, we must start with an analysis of the local properties of the separate tissues, organs and systems before we can acquire a complete perspective of the organism as a whole. We must always bear in mind that those properties which appear to us to be local or "partial constitutional" characteristics, as Martius says, are only partly *localized* or *autochthonous,* and are also partly of *correlative* origin, because of the very requirements of their connection and because of the reciprocal trophic and functional subordination of all the elements of the body in the individual organism, which is one and indivisible. We believe that every form and function of any organ, tissue or cell is the result of at least six conditions: (1) the original and hereditary cellular *autotonus* of the tissue or organ, from which form and function may arise independently of any other regulating factor; (2) hormonic influence; (3) anabolic and catabolic neuro-vegetative influence; (4) the influence of blood crasis (especially through the ionic equilibrium); (5) vascular and vasomotor influence; (6) psychic influence.

If, however, the autonomy of the separate parts is always relative, it cannot be denied that a local attribute may in certain cases be predominantly of autochthonous origin and in others be predominantly of correlative origin. The laws governing heredity show clearly how a constitutional characteristic inherited from ancestors may, in accordance with the laws of anatomical and functional correlation, graft itself, owing to hybridism and hereditary crossing, upon a general plan of bodily construction which is of a type opposed to that with which the kind of characteristic in question is usually associated. On the other hand, exogenous stimuli acting upon the germ plasm in process of development may have an elective affinity only for certain parts of the body, and may determine through the alteration of such parts a general evolutionary imbalance, and hence an anomaly of the entire definitive constitution.

Therefore, in the valuation of the individual constitution, we must exaggerate neither in the *unitary* or *correlational* direction, on the one hand, nor in the *organic* or *local* direction on the other. Even though we believe the essence of the constitution to consist always in the various modes of reciprocal organization and influence, as if in accordance with a general natural law (*cum* and *statuere*) governing the forms and functions of the various parts that make up the total organism, we must still not forget that it is precisely because of the morphological, chemical and psychic imbalance, created by the dominant characteristic of a tissue, an organ or a system that is out of harmony with the laws of correlation that the various constitutions are finally created.

Thus, in judging of the particular type of constitution in any individual for the purpose of finding the principle necessary for the identification and classification of the individual type, we do no more than rise from the *partial constitutions* of Martius to the *total constitution* of Viola, and then descend again from this to the *partial constitutions*, the *local* or *organic dominant characteristics.*

Before defining constitution we must first clear up another point of great practical importance. Does the constitution embrace all the morphological and functional characteristics which distinguish the average human type and which are present at the moment of observation (Johannsen's so-called *phenotype*) regardless of the hereditary or acquired origin of such characteristics? If this were true the constitution would become a great bag into which even the organic modifications produced by past or present disease could be thrown, the more so since, as Richet observes, every disease leaves an imprint, a lasting trace, upon the organism affected, especially from the angle of humoral modification. The result would be that the constitution would have a symptomatology which would be decidedly variable in each individual, and it would be impossible to assign to any individual a special type of constitution which could be recognized in every case as his, and be characteristic enough to form his real personality.

In fact many authors identify the constitution with the individual *disposition* toward disease; and since this disposition may vary in the same individual on account of environment (climate, food) or pathogenetic factors, which more or less modify the susceptibility of the organism to normal and abnormal stimuli, so also in the opinion of these authors does the constitution vary according to circumstance. But although the concept of the constitution includes that of disposition, it is, nevertheless, much greater than the latter, and is concerned with another order of phenomena, namely, those which result from the great biological laws governing ontogenesis and regulating the very evolutionary errors of beings. These laws explain why the constitutional variations are not chaotic, disordered or infinite in number (as are the modifications in the bodies of different individuals, which determine the disease acquired), but remain confined to determined morphological and functional combinations, owing principally to the intervention of the laws of correlation, which of themselves limit the number of possible variations

—a fact which was perceived intuitively by the keen intellect of Achille De Giovanni.

Here, therefore, we find the great principle which enables us to separate the field of constitution from that of simple mutable *individual disposition*.

Constitution is that particular type of bodily fabric which results during the various evolutionary stages and at the termination of the individual's process of maturing, through the action of the great laws regulating the morphological and functional differentiations of the individual and in accordance with the factors of ontogenetic variability, that is, the factors that are capable of making ontogenesis deviate from its usual course. The concept of constitution is, therefore, intimately linked with the manner in which the evolution of the individual takes place from the moment of conception up to full maturity, and with the manner in which the régime of the morphological and physiological correlation between all the parts derived from the fertilized ovum becomes established in the mature individual.

Only those bodily characteristics, those signs which can be included in the general plan of construction characterizing the individual, or which represent the evolutionary errors of such a plan, enter directly into the domain of constitution. And since the variability in the process of formation of beings is governed principally by the laws of heredity, another distinctive criterion of constitutional characteristics is that of having an hereditary or predominantly hereditary foundation, that is, they appear to blossom spontaneously, almost inevitably, in the individual under the impulse of the intangible forces of heredity; or else they arise seemingly under the influence of accidental exogenous factors, which, however, always act in collaboration with a coëfficient of endogenous origin—a coëfficient with an hereditary predisposition more or less clearly demonstrable. Tandler tried to make use of this criterion of the endogenous origin of the most characteristic constitutional phenomena in order to restrict the meaning of *constitution* to the whole of the individual's hereditary characteristics and to the *individual somatic fate*, as he expresses it, which is fixed in the ovum at the moment of fertilization.

Everything that is concerned in the determination of a particular type of bodily construction, but which is due to environmental conditions or to exogenous factors, Tandler calls individual *condition*, in contradistinction to *constitution*, which indicates hereditary patrimony. Thus, in order to indicate all the phenomena of the individual personality, Tandler found himself constrained to coin still another term, "*Koerperverfassung*," bodily complex. This term is in reality not so satisfactory as the old term *constitution* to indicate what we believe to be of greatest interest in the individuality, namely, the coördination of the separate parts in conformity with a particular organic code of laws or unifying principle. And after all, is it right to draw a rigid contrast between hereditary characteristics and conditional characteristics, as do the followers of Tandler? As Richard Koch, a medical man of high critical sense, rightly observes, every form, every function is dependent upon hereditary predisposition (*Anlage* of the Germans) and upon external conditions. In actual life the components of predisposition and of external conditions can never be separated, because we cannot conceive of a form or a function that is solely predisposed or solely conditioned.

Constitutional characteristics, in Tandler's sense, can only be the possibilities or potentialities of the realization of characteristics, but every reality, every concrete manifestation is always at the same time conditional. Moreover, as the followers of Tandler themselves admit, it is extremely difficult to separate what is conditional from what is hereditary in an individual, since the same anomaly of constitution—for instance, an agenesis of the secondary sexual characteristics—may appear to us in one case as subordinate to predominantly hereditary factors, and in another as subordinate to predominantly exogenous factors.

Siemens and Borchardt observe with reason that were Tandler's ideas to be put into practice they would eventually exclude from the field of the various constitutional anomalies almost all the anomalous constitutions hitherto individualized by authors (Stiler's asthenic constitution, thymicolymphatic constitution, hypoplastic constitution, infantilism, etc.) every time it was found that these were not strictly hereditary in the subject, but were due to harmful action exerted by external agents on the fetus or on the subject during the period of development. Thus, in one case infantilism would be a constitutional anomaly and in another it would not! These same followers of Tandler find it especially difficult to agree as to whether or not they should include in the hereditary constitution those characteristics that spring from alterations induced in the germinative cells of the parents by intoxications or infections, chronic alcoholism for instance, tuberculous toxemias, syphilis, etc.

(*Forel's blastophthoric actions*). According to Julius Bauer, these are real constitutional characteristics because they are already predetermined in the fertilized ovum. On the other hand, Toenniessen and others include these characteristics too in Tandler's *condition,* and deny that actual heredity enters at all into these cases of blastophthoria. It is equally difficult to set aside, as not strictly constitutional characteristics of an individual, those which are due to external influences (such as climate, nutrition, psychic disturbances) which have acted upon the organism of the parents and have been registered upon their sex cells through the process known as Semon's *engraphia* or *somatic induction,* so that later the sex cells (at the moment of fertilization) transmit these constitutional characteristics, which are either exogenous or acquired from ancestors, to the product of conception.[1]

Now it is often impossible to distinguish these characteristics from real hereditary ones (Berze, J. Bauer). Nor is it always possible to determine whether an alteration of the germinative cell occurred before the union of the gametes or only during fetal life (Wagner Jauregg).

To sum up, we repeat that it is undeniable that the constitution is determined principally by the internal evolutionary destiny assigned to each individual at the moment of conception. But on the other hand, the individual variability whence spring the various forms of deviation from the average human type is subordinated both to the laws of heredity and to the environmental actions which modify the activation of these laws, without our being able to make an exact distinction between evolutionary conditional factors and factors of hereditary predisposition (Julius Bauer.)

Thus, even while recognizing as essentials of the constitutional variations their characteristics of spontaneity and fixed destiny, we cannot conceive how the manifestation, the realization, of the hereditary tendencies of the individual could be of purely endogenous origin without the concurrence of external conditions. But again it is difficult to conceive how the variations of the type of individual organization could occur through the simple action of exogenous factors without the concurrence of determined hereditary predispositions. For we know that variations of a constitution that are of apparently exogenous origin are not produced in all individuals by the same influences, but only in a few who are especially predisposed by a state of instability of the neuro-endocrine mechanism of correlation of all the parts of the body (see elsewhere). Hence Sigaud and his pupils do not obey a rational constitutional principle of classification when they attach the greatest importance to environmental actions as morphological factors for the distinction of human constitutional types.

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[1] Evidently the author mentions facts which the followers of the doctrine of acquired characteristics accept as demonstrated. Since he makes no declaration as to whether or not he himself accepts the theories of acquired characteristics, we presume that he left the reader free to judge for himself. The translator feels strongly in favor of this theory (*vide* works of Kammerer and especially Pawlow on the inheritance of conditioned reflex in mice), but is fully aware that we are still very far from having given a satisfactory demonstration that acquired characteristics are actually transmitted.—S. N.

When we consider the theoretical and practical inseparability of *condition* and *predisposition*, the sharp distinction that Tandler would make between conditional bodily complex and inherited bodily complex seems unjustifiable, as though the general bodily complex were not always one and indivisible. However, we believe it to be the duty of students of individuality to explore point by point the relative value of the two great indissoluble factors, heredity and environment, in the formation of the constitution.

We may now attempt a definition of constitution on the basis of what we have already shown, by stating that *the constitution is the morphological, physiological and psychological resultant (variable in each individual) of the properties of all the cellular and humoral elements of the body, and of the combination of these in a special cellular state having a balance and functional output of its own, a given capacity for adaptation and a mode of reaction to its environmental stimuli. Such a resultant is determined primarily by the laws of heredity and secondarily by the disturbing influences exercised by the environment upon the individual's hereditary plan of organization.*

It is apparent that the two concepts of *temperament* and *character* may vary well be included in this definition (and we consider this of great value for clinical use and for human biology), in accordance with the requirements of the modern unitary trend of study of the human personality. Form and function, body and mind, can no longer be considered independently of one another, since the individual is a psycho-physical unity wherein form is the plastic image of function (Ruffini), and no judgment is now possible until the dynamic aspect of a constitution has been determined.

We have already observed that temperament may be defined as the psycho-physiological note dominant in a given individual, through a preponderance or a deficiency of an apparatus in the general dynamic equilibrium, and especially through the existence of a humoral state, according to the ancient concept which has been revived in the modern study of biological chemistry.

Now it is evident that we have no reason for making a sharp distinction between temperament and constitution, the former being simply the dynamic-humoral aspect of the latter.

Moreover, according to our modern psychologists, individual character may be defined as the "affective and volitive personality of the individual"[1]—that part of the psyche which has been customarily distinguished from intelligence, although it is neither conceivable nor practically possible to make a definite separation between the two great segments of psychic personality, the affective and the intellective.

It is also clear how *character* is intimately connected with the constitution through the path of *temperament.*

In view of the results of modern psycho-physiological investigations conducted along constitutional lines, we can no longer doubt that intelligence varies in quality as well as in degree in different individuals, nor that it is related to the general constitution of the subject, since there is a growing tendency today to assume that not only the brain but also the whole body takes part in the determination of consciousness.

Thus the unitary study of the individual constitution from a triple point of view, the morphological, the dynamic-humoral and the psychological, now appears perfectly justified, and the most important and novel part of such a study seems to be that which concerns the connections between these three sides of the personality.

We may graphically represent the constitution as a triangular pyramid, the base of which encloses the patrimony of the individual's inherited characteristics and the variations occurring during the evolutionary stages. From the base three faces rise, with sides joined one to another—the morphological, the dynamic-humoral (temperament) and the psychological (character, intelligence). The synthesis of the three faces is the apex of the pyramid, that is, the synthesis of the individual's vital properties, his resistance to his environment, and his complete dynamic output. Each one of these faces of the constitution is characterized by a *dominant note,* and it is these three dominant notes, as we shall see, that will constitute for us the triple criterion of the modern classification of constitutional types. It is by these that the individual's constitution, or, as I have termed it, the individual *biotype*, may be distinguished from the type of somatic and psychic conformation of the species, that is, from the so-called normal type of man in a given ethnic group, a type which does not exist otherwise than as an abstraction, since each individual represents a variant of the ideal type of the species, precisely by virtue of his own constitution.

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[1] Kretschmer writes: "Unter Charakter verstehen wir die Gesamtheit aller affektiv-willensmässigen Reaktionsmöglichkeiten eines Menschen wie sie im Laufe seiner Lebensentwicklung entstanden sind."

Constitutional anatomy, physiology and psychology may, therefore, be looked upon as differential anatomy, physiology and psychology, in contradistinction to the generic anatomy, physiology and psychology of the species man, which we find discussed in treatises.

Hence also constitutional pathology is essentially a differential pathology, a pathology of the morbid variations due to the special personality of the individual; that is, it is essentially clinical medicine because this considers the separate individual patients and not the picture of a disease entity which is formed *by abstraction*. Clinical medicine is, in other words, true *personal pathology*, as F. Kraus says, in the same way that human biotypology, according to his followers, is *personal biology*.

* * *

We must now seek to determine just what is meant by *constitutional anomaly* and *constitutional disease*, for it is rather difficult to draw an exact line of demarcation between the two.

By constitutional anomaly we mean a variation of constitution that departs so far from the average normal type that it can no longer be considered as belonging within the domain of normal variability. But the question arises, What is the domain of normal variability, and what is the average type? The modern method of determining this is the statistical method of *serial frequency curves*. Quetelet introduced this method into human biology in the study of variations in stature, and the great Belgian anthropologist made the interesting discovery that these variations follow the laws of accidental errors of Gauss,[1] and hence are not chaotic but are governed by a mathematical law known today as the *binomial law* of Quetelet-Gauss. This law states that the distribution of the individual variations in an ethnic group is determined by conditions which lead to a uniform deviation of the separate individuals on the two sides of the average central value of the curve.

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[1] This has since been denied by J. Kaup, but not, I think, with any logical reason. In his opinion the variability of all bodily measurements is inversely proportional to the square of the distance from the average value in concentric circles of intensity and frequency.

Following the example of Quetelet, Viola applied the method of the serial curve to clinical anthropometry, and was thus able to compute the average values of frequency of all the external measurements of the human body in the population of the Italian district of Venetia. We are able today to make many morphological, physiological and psychological characteristics conform to this binomial law of Quetelet-Gauss, according to their variations. This can be readily understood for all those characteristics that can be determined numerically, and hence for all bodily measurements that can be obtained by external and visceral anthropometry (measurements of visceral roentgenology), for the values that are ascribed to the morphology of the blood, and the estimate of the various substances present in the blood, urine, etc.

But for a large number of other characteristics, such as coloring, form, localization of the organs, quality of hair, degree of functioning of the various apparatus, the degree of intelligence and various psychic properties, we must make a division into classes in order to apply the binomial law, whereupon the approximation of these characteristics as well to the said law becomes established.

To this variability of determined characteristics in a twofold direction around the average central value or *type* we give the name *bipolar* or *fluctuant variability*. The arithmetical sum of the deviations to the right and left of the type value in the binomial distribution is zero.

But we also find characteristics that deviate from the type value in one direction only. We speak then of a *unipolar variability* (J. Bauer), for example, ectopic kidneys, palatoschisis, supernumerary mammæ, provided we find in these cases all forms of transition between the average value and the variant.

On the other hand, when the variant cannot be identified with the typical characteristic by degrees of transition, that is, when there are no quantitative deviations, but there is either a typical characteristic or a variant one, we speak of an *alternative variability*, such as aplasia of an organ, persistence of the duct of Botallo, etc.

We may, therefore, designate as normal that characteristic which occupies or approaches the average value of its curve of variation.

Hence, in order to establish the measure of the variability, we must first of all determine through the separate characteristics the standard deviation from the center of the curve. This standard deviation is indicated by the letter σ and its mathematical expression is

$$\sigma = \pm\sqrt{\frac{\Sigma\ p\ D^2}{n}}$$

in which D is the deviation from the average value; p, the number of individuals that present the respective deviations; Σ, the sum of all the squares of the deviations; n, the total number of individuals; σ represents centimeters or grams or any given unit chosen for the measurement of a characteristic.

Thus, in the English, Pearson found in a total of 1000 adults under sixty-five years of age an average stature of 172.81 cm. for men and 159.90 cm. for women; $\sigma = 7.04$ for men and 6.44 for women; that is, the average deviation in stature in women is less than that in men.

According to Bauer, a characteristic which presents a bipolar variability is normal if it falls between $\mp 2\sigma$ or $\mp 3\sigma$; beyond these limits we are dealing with anomalies.[1]

Given an exact binomial curve, the following percentages of the total population would correspond to the limits quoted above. Within

∓ 1.0 we find σ = 68.3 per cent.
∓ 1.5 " " = 86.6 "
∓ 2.0 " " = 95.5 "
∓ 3.0 " " = 99.7 "

of all the individuals in the series. In cases of alternative variability we can keep to these percentages instead of to σ.

Thus, according to Bauer, we can establish that at least 95.5 per cent of all individuals behave normally with regard to their separate characteristics, and that at most only 4.5 per cent behave in an anomalous manner. We could not regard as anomalies a case of alternative variability in which the frequency of the variant is more than 4.5 per cent. Therefore, the less frequent the characteristic studied, that is, the farther away it is from the average value, the more serious is the constitutional anomaly.

It should be noted, however, that it is not the single anomaly in itself that has clinical value, since there are many extreme localized variants that in no way imperil the health, such as heterochromia of the iris, deformity of the ear lobe, etc. What counts is the accumulation of such anomalies—the multiplex anomaly, as Gunther calls it—and the significance that an extreme variation may have as an index, as a *stigma*, of a general anomalous bodily constitution, of a more complex functional and evolutionary imbalance.

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[1] See further on our opinion of the difficulty of judging of individual sanity on the sole basis of such anomalies in Bauer's sense of the word.

It is at this point that we must turn to the unitary concept of constitution, bearing in mind that we cannot arrive at an estimate of this merely by considering the separate local variations but must acquire a perspective of the whole organism.

J. Bauer writes: "The more or less close synergy of all the parts, the correlation of all the functions, leads to the implication that behind the separate degenerative stigmata which are accessible to clinical investigation there are usually concealed anomalies of reaction about which we can obtain information only *a posteriori*, that is, when the appropriate stimuli (psychic, infectious, toxic, traumatic, etc.) enter into play." We can, however, still add that even if it were possible to know all the curves of variability of the individual morphological and functional characters of all ages, of both sexes and of all human races, the judgment of what constitutes normal, and what, anomalous, constitution would still not be practically possible, for the reason that our knowledge would always miss the precise mode *sui generis* of correlation between the various channels in the formation of the whole mass, upon which the dynamic side of the individual constitution essentially depends.

Just as there is a gradual transition between the characteristic which is within the limits of normal variability and the one that is a constitutional anomaly, so is the transition between *constitutional anomaly* and *constitutional disease* also gradual.

There is a boundary line that is easily and imperceptibly crossed between the mere anomaly of carbohydrate metabolism that exists in an individual by reason of an anomalous constitution, owing to which the blood sugar is at the highest possible limit compatible with apparent health (latent hyperglycemia), and a frank constitutional diabetes. The same is true of an anomaly of purin metabolism which gives place to latent uricemia and the development of gout; or of a general mild hypoevolutism of thyroid or hypophyseal origin and a clinical syndrome of true infantilism of hypothyroid or hypopituitary origin, respectively, and so on.

We speak of *anomalous constitution* as a rule when we are dealing with a *preclinical state*, in which, as we have already explained, the endogenous factors preponderate over the exogenous. But frequently this concept of predisease state or constitutional state is found, upon closer clinical observation, to be fictitious and illusory; often we are dealing with diseases already present in a more or less latent state, and with actual morbid conditions. Tuberculosis is an example of this. Latent tuberculosis is very frequently confused in practice with true pretuberculosis, that is, with a tuberculous predisposition due to an anomalous constitution. The same confusion occurs in the case of the so-called diatheses.

By this term, which etymologically signifies disposition, we mean certain anomalous or morbid temperaments which no longer belong within the confines of the normal variability of temperaments but already begin to represent potential disease conditions. They may be distinguished by the fact that physiological stimuli, such as foods, develop abnormal or truly pathological reactions in the diathetic individuals, and that conditions of life that are borne by the majority of individuals without injury (for instance, sunlight) produce morbid states in these subjects (W. His). We can distinguish, from a practical standpoint, six principal diatheses that comprise all morbid temperaments: (1) arthritic (this includes the exudative and hypersecretory); (2) neuro-endocrinopathic; (3) psychopathic; (4) heredo-syphilitic; (5) heredo-tuberculous; (6) heredo-neoplastic.

Hence the concept of diathesis enters into the larger concept of constitution, particularly of constitution so seriously anomalous that even ordinary exogenous stimuli may cause special forms of disease to breed upon diathetic soil. But in the practical application of the diathetic concept we often speak of diathesis when we have already entered the domain of *diathetic disease*.

This, however, is easily understood when we consider diathesis *a posteriori*, that is, when we are in the presence of the development of specific disease reactions on that given diathetic soil and when the clinician is more interested in determining the common foundation of all these numerous clinical syndromes, which constitute diathesis, than in the form assumed by the disease reactions (a form that may vary from individual to individual, and even in the same individual at different times, or in various organic apparatus).

Here, therefore, the distinction between diathesis and disease is found extremely difficult, if not impossible, in practice, since by the time diathesis can be recognized it has already reached an active morbid state. Later we shall see numerous examples of this concept in connection with the *exudative* and especially the *arthritic diathesis*—the two diatheses most studied today.

CHAPTER II.

CONCEPT OF CONSTITUTIONAL STRENGTH AND WEAKNESS.

Viola's ontogenetic principle—The relations of the vegetative and the animal system—Viola's anthropometric procedure—The fundamental criteria for the judgment of constitution—Distinction of two great ectypes—Brachymorphic and dolichomorphic constitutions—Their relation to anabolic and catabolic functions—Difference between normal and healthy individuals—Necessity for a clinical as well as an anthropometric criterion.

From our definition of constitution we derive the criterion which enables us to judge whether a constitution is strong or weak. The word strength has a very different meaning for us from that which it conveys to the laity. The latter pictures a robust individual as one who presents a development both of skeleton and of muscle that is above the average, whose skin has an excellent color, one who has an ample thorax and a more than satisfactory, if not positively exuberant, general state of nutrition. In a child people are apt to mistake for robustness of constitution the presence of fat and abundance of cutaneous capillaries which cause a vivid complexion. When the manufacturer of so-called patent medicines or tonics wants to represent a strong type of adult or infant in his advertisements he picks out an athlete or a fat, chubby, rosy baby. Even some of the best artists have made this mistake!

In modern medicine, however, the concept of strength is not only morphological but functional as well, and is founded, as Viola has shown, upon the extent of functional capacity of the organism or of the organ. But even in its morphological expression it is based essentially upon balance, upon harmony, upon the perfect vital unity of all parts of the body, presupposing, however, a normal morphological evolution of each individual part. The closer the coördination and the unification of the bodily elements to complete development, and the stronger the constitution—that is, the static and dynamic resultant of such a synthesis of the various parts—the more capable is it of perfect functional output and of strong resistance to the exogenous causes which disorganize living matter.

In the single organism, as in groups of individuals, strength lies in unity, while in disharmony, in the insufficient vital unity of the individual, lies weakness.

We cannot, therefore, judge of the strength or weakness of the constitution simply by an analysis of the functional strength or weakness of separate organs and apparatus, but can form a correct judgment only after analyzing the reciprocal correlations and developmental proportions and the functional energy of the various tissues, organs, apparatus and segments of the bodily machine.

Any excess or deficiency of a part will impair the general dynamic equilibrium and will represent a reason for constitutional weakness and disease, as was first demonstrated by Achille De Giovanni more than half a century ago. Hence from this point of view, weakness also inheres in the overdevelopment of the skeletal and muscular systems, even though the individual may appear to possess exceptional strength. Athletes are more readily subject than other men to arterial hypertonia and hypertension, arteriosclerosis, cardiac hypertrophy, and, secondarily, to circulatory insufficiency (De Giovanni); also, according to Bauer, to rheumatism in its various forms. Constitutional weakness also exists for us in an exuberance of development of a psychic quality and in some forms of so-called genius (partial genius), when, as is frequently the case, this excess is accompanied by a deficiency of development in other domains of the psyche, that is, by a state of psychic imbalance.

There are still large gaps in our knowledge of the normal proportions of the various tissues and organs and of the various sections of the body, as well as of the developmental proportions of the various parts of the psyche (the affective and intellective spheres, for example); especially little do we know of the variations which these proportions undergo during the various stages of life in the two sexes. A knowledge of these would throw much light on the genesis of many anomalous forms of general constitution, since many of these are due to the persistence in the adult of physiological proportions and correlations typical of earlier periods of growth (various forms of local and general hypoevolutism), or else they are the result of a more advanced degree of morphological and functional evolution than that which would be physiological for the individual's age (hyperevolutism). For the proportional external measurements of the adult human body we have today as a standard of comparison the figures of Viola and Fici, which were obtained by the statistical method of serial curves and put into two *tables of degrees* for the average adult male and female, respectively (Venetian population). These tables (Tables I and II, pages 38 and 40) enable us to determine at once, by a comparison with the average human figure, the particular disproportions and their degree in the external form of body of any given adult.[1]

But analogous tables of measurement of the *average type* must be compiled by means of this same serial curve method for the principal periods of growth and for each sex separately. Up to the present time Godin's interesting studies on growth have been of great value. These include the new-born, the child of six years, adolescents of thirteen and a half, fifteen and a half, and seventeen and a half years, and the adult of twenty-three years.[2]

Canons of visceral anthropometry established contemporaneously with those of external anthropometry would also be of great interest. And finally, *functional canons* should be established, relating to constitutional physiology, with its more modern part, the humoral state or temperament at the various ages of life and in the two sexes. To this we must also add the normal *psychogram.*

We are still only on the threshold of this vast undertaking and must for the present be content to keep within certain lines of orientation and isolated facts obtained from a study of the cadaver and hence not very reliable. Visceral anthropometry in the living subject can be only partially accomplished by the roentgenological method. This fact explains certain inaccuracies which we have encountered in the estimate of some constitutional anomalies. For example, it was recently discovered by Groll in examining soldiers that hyperplasia of the lymphatic tissue is far more normal in young persons than has hitherto been supposed from investigations made on cadavers, in which the lymphatic tissue is reduced by a process of involution of this tissue produced by the disease from which the patient died. On the basis of ideas obtained from cadavers we have accordingly regarded as a constitutional anomaly (lymphatism) a condition that is really normal for that age.

From all this we gather that an indispensable premise in the judgment of constitutional strength or weakness is the anatomy, morphology and physiology of normal growth both of the tissues and of the individual organs, as well as of the organism considered synthetically.

From this point of view nothing is more interesting for the understanding of constitutional anomalies than the following ontogenetic law of Viola: "The ponderal (weight) evolution, or increase of mass, and the morphological evolution, or change of proportion, are in inverse proportion to each other. The more an organism evolves ponderally the less does it evolve morphologically; the less it evolves ponderally the more does it evolve morphologically."

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[1] Very recently Berghinz has published tables of the biometric averages for each year of age from the new-born to eleven years. These tables (see page 42, Table II*a*) give many anthropometric measurements and the index values analogous to those of Viola and Fici.—S. N.

[2] Female anthropometric values from eleven years to adult age are at present under investigation.

According to Viola, the original evolutional spurt which the organism receives *ab ovo* seems to be divided into two distinct forces. One of these determines the increase in the somatic mass, or the growth, and the other brings about the morphological transformations, or the *differentiation*. An unbalance of the two energies of development occurs possibly from causes intrinsic to the evolutionary impulse or possibly from extrinsic causes related to the degree of ease with which the germ plasm is nourished and the quality of the nutriment furnished by the environment in which it is developing and while the germ assimilates to excess and increases in size, it slows down its evolutionary morphological course, or *vice versa*.

But since the vegetative system of the living being provides for assimilation and for augmenting of the mass, while the animal system, or system of the life of relation, provides for the transformation of energy, that is, for the relations with the environment, and hence for changes of form which establish variable and even more complex relations with the environment itself, we can formulate another law from the one already cited, namely, that the two great systems distinguished by Bichat, the vegetative and the animal, are in inverse ratio of development in ontogenetic evolution -the greater the development of the vegetative system, the less developed is the system of relation; and conversely, the stronger is this latter, the less developed is the vegetative system.

According to Viola's studies, this evolutionary disharmony between the two systems constitutes the primary natural reason for the arising of two great antithetic types of deformation or deviation from the average of normal human constitution. The type in which the bodily mass is in excess over the proportions and in which the vegetative system preponderates over the animal Viola calls the *megalosplanchnic* (a type having a large trunk within which are the organs of the vegetative life). The type in which, conversely, the morphological differentiation and the animal system preponderate over the total mass and the vegetative system he calls the *microsplanchnic*.

Viola rightly interprets the first type of deviation, our hypervegetative, as one morphologically hypoevolute, a type which approaches that of the child in bodily proportions; the opposite type, the microsplanchnic, our hypovegetative, he regards as a hyperevolute type, that is, one in which the bodily proportions which distinguish the adult from the child are even more pronounced than in the adult himself.

The ontogenetic principle established by Viola finds confirmation in a fact that has been brought out by many authors, and especially by the accurate measurements of Godin, namely, that, in normal growth, phases of growth in width alternate with phases of growth in length. The former are represented by an increase in bodily mass, especially in the volume of the trunk (thorax and abdomen), while the latter find their expression in an increase in length of the extremities and a greater development of the central nervous system, the system of animal life.

According to Godin, this *law of alternations*, as he calls it, between the development in breadth and in length is also found to exist in the individual segments of the body. Now it happens, in accordance with the great biological law of error, that some individuals deviate from the average in an excessive development in breadth and others in excessive development in length. Hence there arise two *ectypes* which can be identified with the megalosplanchnic and microsplanchnic ectypes of Viola, namely, the brevilineal (brachymorphic) and the longilineal (dolichomorphic) types.[1]

Thus we have determined the fundamental criterion for a first analysis of constitution, for a first judgment upon the existence within this constitution of a state of morphological balance or imbalance, to which, as we shall see, there nearly always corresponds a dynamic balance or imbalance. In other words, we have determined the criterion of the relation in the individual between the degree of development attained by the vegetative system and that attained by the animal system, or between the width and the length of the body, respectively.[2] This is the rational criterion because it is guided by a law that governs the phenomena of normal ontogenesis. With Viola we shall assume the size of the trunk to be an expression of the vegetative development, and the length of the limbs to be an expression of the animal development. To these may be added certain descriptive characteristic notes about the head, face, skin, etc., to complete the criterion of the degree of morphological differentiation.

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[1] The terms *brachymorphic* and *dolichomorphic* have been used by us in our works to designate what Viola calls *brevilineal* and *longineal*. We shall use the Greek terminology henceforth in place of the Latin brevilineal and longilineal.—S. N.

[2] Recently J. Kaup (Die Biologie der Person, von Kraus-Brugsch, **1**, 211) has arrived at the conclusion that the volume of the viscera and the relation of this to the length and breadth of the body is the most exact criterion for the judgment of constitutional harmony or disharmony. It is interesting to note that Viola has started from the seriation of the trunk's volume and from the proportion between the trunk and other measurements in building his table of degrees.

With a certain amount of practice the fundamental relation of these two lines of development can be established on sight, by simple inspection, but to determine the exact degree of disproportion we must adopt Viola's anthropometric procedure. (For the technique in detail the reader is referred to the original work of Viola and Fici.) The measurements made use of for this purpose are as follows:

1. Sternal height (from the anterior margin of the jugular notch to the base of the insertion of the xiphoid process).
2. Xipho-epigastric length (from the base of the xiphoid process to the point where the median vertical line of the body crosses the horizontal line drawn at the lower margin of the ribs).
3. Epigastric-pubic length (from the said horizontal to the upper margin of the pubes.
4. Length of lower extremities (from the upper margin of the pubes to the line which divides in half the width of the external malleolus and corresponds to the interarticular line of the foot).
5. Length of upper extremities (from the external margin of the acromion to the interarticular line of the wrist-joint, with the arms hanging down).
6. Transverse thoracic diameter, at the level of the fourth rib.
7. Anterior-posterior thoracic, or sterno-vertebral, diameter, at the level of the fourth rib.
8. Hypochondriac transverse diameter, at the level of the line which divides in half the xipho-epigastric line.
9. Hypochondriac antero-posterior or abdomino-vertebral diameter obtained at the same level.
10. Transverse pelvic diameter (the greatest distance between the two iliac crests).

With these measurements we can reconstruct the synthetic anthropometric figure of the human body for comparison with the figure of the average adult type.

Table I.—Degrees for the Average Venetian Adult Male. (Viola.)

DEGREES OF DEFICIENCY.

Degrees	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	−11	−12	−13	−14	−15	−16	−17	−18	−19	−20	−21	−22	−23	−24	−25	−26	−27	−28	−29	−30
Values.																															
Trunk	28.4	27.6	26.8	26.0	25.3	24.4	23.7	23.0	22.3	21.5	20.8	20.1	19.5	18.8	18.1	17.4	16.9	16.2	15.7	15.1	14.5	14.0	13.4	12.8	12.4	12.0	11.5	11.1	10.8	10.2	9.8
Extremities	135.5	134.1	132.8	131.4	130.0	128.7	127.4	126.0	124.7	123.3	121.9	120.6	119.2	117.9	116.5	115.1	113.9	112.5	111.1	109.8	108.4	107.0	105.7	104.3	102.9	101.6	100.3	98.9	97.6	96.2	94.8
Thorax	8.6	8.4	8.1	7.9	7.7	7.4	7.2	7.0	6.8	6.5	6.3	6.1	5.9	5.7	5.5	5.3	5.1	4.9	4.8	4.6	4.4	4.3	4.1	3.9	3.8	3.7	3.5	3.4	3.3	3.1	3.0
Whole abdomen	19.8	19.	18.7	18.1	17.6	17.0	16.5	16.0	15.5	15.0	14.5	14.0	13.6	13.1	12.6	12.1	11.8	11.3	10.9	10.5	10.1	9.7	9.3	8.9	8.6	8.3	8.0	7.7	7.5	7.1	6.8
Upper abdomen	7.6	7.4	7.2	7.0	6.8	6.6	6.4	6.2	6.0	5.8	5.6	5.4	5.3	5.1	4.9	4.7	4.6	4.4	4.2	4.1	3.9	3.7	3.6	3.4	3.3	3.2	3.1	3.0	2.9	2.7	2.6
Lower abdomen	12.2	11.8	11.5	11.1	10.8	10.4	10.1	9.8	9.5	9.2	8.9	8.6	8.3	8.0	7.7	7.4	7.2	6.9	6.7	6.4	6.2	6.0	5.7	5.5	5.3	5.1	4.9	4.7	4.6	4.4	4.2
Measurements.																															
Thorax:																															
Sternal height	15.6	15.4	15.3	15.1	15.0	14.8	14.7	14.5	14.4	14.2	14.0	13.9	13.7	13.6	13.4	13.3	13.1	12.9	12.8	12.6	12.5	12.3	12.2	12.0	11.9	11.7	11.5	11.4	11.2	11.1	10.9
Trans. thor. diam.	27.7	27.4	27.1	26.9	26.6	26.3	26.0	25.8	25.5	25.2	24.9	24.7	24.4	24.1	23.8	23.5	23.3	23.0	22.7	22.4	22.2	21.9	21.6	21.3	21.1	20.8	20.5	20.2	19.9	19.7	19.1
Ant.-post. thor.	20.0	19.8	19.6	19.4	19.2	19.0	18.8	18.6	18.4	18.2	18.0	17.8	17.6	17.4	17.2	17.0	16.8	16.6	16.4	16.2	16.0	15.8	15.6	15.4	15.2	15.0	14.8	14.6	14.4	14.2	14.0
Upper abdomen:																															
Xipho-epigastric	14.4	14.3	14.1	14.0	13.8	13.7	13.5	13.4	13.2	13.1	13.0	12.8	12.7	12.5	12.4	12.2	12.1	12.0	11.8	11.7	11.5	11.4	11.2	11.1	10.9	10.8	10.7	10.5	10.4	10.2	10.1
Trans. hypochond.	26.5	26.2	26.0	25.7	25.4	25.2	24.9	24.6	24.4	24.1	23.8	23.6	23.3	23.0	22.8	22.5	22.3	22.0	21.7	21.5	21.2	20.9	20.7	20.4	20.1	19.9	19.6	19.3	19.1	18.8	18.5
Ant.-post. hypochond.	20.0	19.8	19.6	19.4	19.2	19.0	18.8	18.6	18.4	18.2	18.0	17.8	17.6	17.4	17.2	17.0	16.8	16.6	16.4	16.2	16.0	15.8	15.6	15.4	15.2	15.0	14.8	14.6	14.4	14.2	14.0
Lower abdomen:																															
Epigastric-pubic	21.0	20.8	20.6	20.4	20.2	19.9	19.7	19.5	19.3	19.1	18.9	18.7	18.5	18.3	18.1	17.8	17.6	17.4	17.2	17.0	16.8	16.6	16.4	16.2	16.0	15.7	15.5	15.3	15.1	14.9	14.7
Trans. pelvic	29.0	28.7	28.4	28.1	27.8	27.5	27.3	27.0	26.7	26.4	26.1	25.8	25.5	25.2	24.9	24.6	24.4	24.1	23.8	23.5	23.2	22.9	22.6	22.3	22.0	21.7	21.5	21.2	20.9	20.6	20.3
Extremities:																															
Upper extremity	56.5	55.9	55.4	54.8	54.2	53.7	53.1	52.5	52.0	51.4	50.8	50.3	49.7	49.2	48.6	48.0	47.5	46.9	46.3	45.8	45.2	44.6	44.1	43.5	42.9	42.4	41.8	41.2	40.7	40.1	39.5
Lower extremity	79.0	78.2	77.4	76.6	75.8	75.0	74.3	73.5	72.7	71.9	71.1	70.3	69.5	68.7	67.9	67.1	66.4	65.6	64.8	64.0	63.2	62.4	61.6	60.8	60.0	59.2	58.5	57.7	56.9	56.1	55.3
Compound:																															
Jugulopubic	51.0	50.5	50.0	49.5	49.0	48.4	47.9	47.4	46.9	46.4	45.9	45.4	44.9	44.4	43.9	43.3	42.8	42.3	41.8	41.3	40.8	40.3	39.8	39.3	38.8	38.2	37.7	37.2	36.7	36.2	35.7
Height, whole abdomen	35.4	35.0	34.7	34.3	34.0	33.6	33.3	32.9	32.6	32.2	31.9	31.5	31.2	30.8	30.4	30.1	29.7	29.4	29.0	28.7	28.3	28.0	27.6	27.3	26.9	26.5	26.2	25.8	25.5	25.1	24.8
Stature	168.0	166.3	164.6	163.0	161.3	159.6	157.9	156.2	154.6	152.9	151.2	149.5	147.8	146.2	144.5	142.8	141.1	139.4	137.8	136.1	134.0	132.7	131.0	129.4	127.7	126.0	124.3	122.6	121.0	119.5	117.6

Table I.—Degrees for the Average Venetian Adult Male. (Viola.)—*Continued.*

DEGREES OF EXCESS.

Degrees	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
VALUES.																
Trunk	28.4	29.3	30.3	31.1	32.0	32.9	33.9	34.8	35.9	36.8	37.8	38.9	39.9	41.0	42.1	43.2
Extremities	135.5	136.9	138.2	139.6	141.0	142.2	143.6	145.0	146.3	147.7	149.0	150.4	151.8	153.1	154.5	155.8
Thorax	8.6	8.9	9.2	9.5	9.7	10.0	10.3	10.6	10.9	11.2	11.5	11.8	12.1	12.4	12.8	13.1
Whole abdomen	19.8	20.4	21.1	21.6	22.3	22.9	23.6	24.2	25.0	25.6	26.3	27.1	27.8	28.6	29.3	30.1
Upper abdomen	7.6	7.8	8.1	8.3	8.6	8.8	9.1	9.3	9.6	9.8	10.1	10.4	10.7	11.0	11.3	11.6
Lower abdomen	12.2	12.6	13.0	13.3	13.7	14.1	14.5	14.9	15.4	15.8	16.2	16.7	17.1	17.6	18.0	18.5
MEASUREMENTS.																
Thorax:																
Sternal height	15.6	15.8	15.9	16.1	16.2	16.4	16.5	16.7	16.8	17.0	17.2	17.3	17.5	17.6	17.8	17.9
Trans. thor. diam.	27.7	28.0	28.3	28.5	28.8	29.1	29.4	29.6	29.9	30.2	30.5	30.7	31.0	31.3	31.6	31.9
Ant.-post. thor.	20.0	20.2	20.4	20.6	20.8	21.0	21.2	21.4	21.6	21.8	22.0	22.2	22.4	22.6	22.8	23.0
Upper abdomen:																
Xipho-epigastric	14.4	14.5	14.7	14.8	15.0	15.1	15.3	15.4	15.6	15.7	15.8	16.0	16.1	16.3	16.4	16.6
Trans. hypochond.	26.5	26.8	27.0	27.3	27.6	27.8	28.1	28.4	28.6	28.9	29.1	29.4	29.7	29.9	30.2	30.5
Ant.-post. hypochond.	20.0	20.2	20.4	20.6	20.8	21.0	21.2	21.4	21.6	21.8	22.0	22.2	22.4	22.6	22.8	23.0
Lower abdomen:																
Epigastric-pubic	21.0	21.2	21.4	21.6	21.8	22.0	22.3	22.5	22.7	22.9	23.1	23.3	23.5	23.7	23.9	24.1
Trans. pelvic	29.0	29.3	29.6	29.9	30.2	30.5	30.7	31.0	31.3	31.6	31.9	32.2	32.5	32.8	33.1	33.3
Extremities:																
Upper extremity	56.5	57.1	57.6	58.2	58.8	59.3	59.9	60.5	61.0	61.6	62.1	62.7	63.3	63.8	64.4	65.0
Lower extremity	79.0	79.8	80.6	81.4	82.2	82.9	83.7	84.5	85.3	86.1	86.9	87.7	88.5	89.3	90.1	90.8
Compound:																
Jugulopubic	51.0	51.5	52.0	52.5	53.0	53.5	54.1	54.6	55.1	55.6	56.1	56.6	57.1	57.6	58.1	58.6
Height, whole abdomen	35.4	35.8	36.1	33.5	36.8	37.2	37.5	37.9	38.2	38.6	39.0	39.3	39.6	40.0	40.4	40.7
Stature	168.0	169.7	171.4	173.0	174.7	176.4	178.1	179.8	181.4	183.1	184.8	186.5	188.2	189.8	191.5	193.2

Degrees	+16	+17	+18	+19	+20	+21	+22	+23	+24	+25	+26	+27	+28	+29	+30
VALUES.															
Trunk	44.4	45.6	46.8	48.0	49.2	50.4	51.8	53.1	54.2	55.5	57.0	58.3	59.8	61.1	62.5
Extremities	157.1	158.5	159.9	161.2	162.6	164.0	165.3	166.7	168.1	169.3	170.7	172.1	173.4	174.8	176.1
Thorax	13.5	13.9	14.2	14.6	14.9	15.3	15.7	16.1	16.4	16.8	17.3	17.7	18.2	18.6	19.0
Whole abdomen	30.9	31.7	32.6	33.4	34.3	35.1	36.1	37.0	37.8	38.7	39.7	40.6	41.6	42.5	43.5
Upper abdomen	11.9	12.2	12.5	12.8	13.2	13.5	13.9	14.2	14.6	14.9	15.3	15.6	16.0	16.3	16.7
Lower abdomen	19.0	19.5	20.1	20.6	21.1	21.6	22.2	22.8	23.2	23.8	24.4	25.0	25.6	26.2	26.8
MEASUREMENTS.															
Thorax:															
Sternal height	18.1	18.3	18.4	18.6	18.7	18.9	19.0	19.2	19.5	19.5	19.7	19.8	20.0	20.1	20.3
Trans. thor. diam.	32.1	32.4	32.7	33.0	33.2	33.5	33.8	34.1	34.3	34.6	34.9	35.2	35.5	35.7	36.0
Ant.-post. thor.	23.2	23.4	23.6	23.8	24.0	24.2	24.4	24.6	24.8	25.0	25.2	25.4	25.6	25.8	26.0
Upper abdomen:															
Xipho-epigastric	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	18.0	18.1	18.3	18.4	18.6	18.7
Trans. hypochond.	30.7	31.0	31.3	31.5	31.8	32.1	32.3	32.6	32.9	33.1	33.4	33.7	33.9	34.2	34.4
Ant.-post. hypochond.	23.2	23.4	23.6	23.8	24.0	24.2	24.4	24.6	24.8	25.0	25.2	25.4	25.6	25.8	26.0
Lower abdomen:															
Epigastric-pubic	24.4	24.6	24.8	25.0	25.2	25.4	25.6	25.8	26.0	26.2	26.5	26.7	26.9	27.1	27.3
Trans. pelvic	33.6	33.9	34.2	34.5	34.8	35.1	35.4	35.7	36.0	36.2	36.5	36.8	37.1	37.4	37.7
Extremities:															
Upper extremity	65.5	66.1	66.7	67.2	67.8	68.4	68.9	69.5	70.1	70.6	71.2	71.8	72.3	72.9	73.4
Lower extremity	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.2	98.0	98.8	99.5	100.3	101.1	101.9	102.7
Compound:															
Jugulopubic	59.2	59.7	60.2	60.7	61.2	61.7	62.2	62.7	63.2	63.7	64.3	64.8	65.3	65.8	66.3
Height, whole abdomen	41.1	41.4	41.8	42.1	42.5	42.8	43.2	43.5	43.9	44.2	44.6	45.0	45.3	45.7	46.0
Stature	194.9	196.6	198.2	199.9	201.6	203.3	205.0	206.6	208.3	210.0	211.7	213.4	215.0	216.7	218.0

TABLE II.—DEGREES FOR THE AVERAGE VENETIAN ADULT FEMALE. (VIOLA AND FICI.)

DEGREES OF DEFICIENCY.

Degrees	0	−1	−2	−3	−4	−5	−6	−7	−8	−9	−10	−11	−12	−13	−14	−15	−16	−17	−18	−19	−20	−21	−22	−23	−24	−25	−26	−27	−28	−29	−30
VALUES.																															
Trunk	24.3	23.6	22.8	22.3	21.4	20.8	20.3	19.5	18.9	18.3	17.7	17.0	16.5	16.0	15.4	14.9	14.3	13.7	13.4	12.9	12.3	11.8	11.4	11.0	10.6	10.2	9.7	9.3	8.9	8.5	8.1
Extremities	123.5	122.3	121.0	119.7	118.5	117.2	116.0	114.8	113.6	112.5	111.3	109.9	108.7	107.5	106.2	105.1	103.8	102.6	101.3	100.1	98.9	97.6	96.4	95.2	93.8	92.7	91.4	90.2	89.0	87.7	86.5
Thorax	6.6	6.4	6.2	6.0	5.8	5.6	5.5	5.3	5.1	5.0	4.8	4.6	4.5	4.3	4.2	4.0	3.9	3.7	3.6	3.5	3.3	3.2	3.1	3.0	2.9	2.8	2.6	2.5	2.4	2.3	2.2
Whole abdomen	17.7	17.2	16.6	16.3	15.6	15.2	14.8	14.2	13.8	13.3	12.9	12.4	12.0	11.7	11.2	10.9	10.4	10.0	9.8	9.4	9.0	8.6	8.3	8.0	7.7	7.4	7.1	6.8	6.5	6.2	5.9
Upper abdomen	5.3	5.2	5.0	4.9	4.7	4.6	4.5	4.3	4.2	4.0	3.9	3.7	3.6	3.5	3.4	3.3	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7
Lower abdomen	12.4	12.0	11.6	11.4	10.9	10.6	10.3	9.9	9.6	9.3	9.0	8.7	8.4	8.2	7.8	7.6	7.3	7.0	6.9	6.6	6.3	6.0	5.8	5.6	5.4	5.2	5.0	4.8	4.6	4.4	4.2
MEASUREMENTS.																															
Thorax:																															
Sternal height	13.4	13.3	13.1	13.0	12.8	12.7	12.6	12.4	12.3	12.2	12.0	11.9	11.8	11.6	11.5	11.3	11.2	11.1	10.9	10.8	10.7	10.5	10.4	10.3	10.2	10.1	9.9	9.8	9.7	9.5	9.4
Trans. thor. diam.	26.0	25.7	25.5	25.2	24.9	24.7	24.4	24.2	23.9	23.6	23.4	23.1	22.8	22.6	22.4	22.1	21.8	21.6	21.3	21.0	20.8	20.5	20.3	20.0	19.7	19.5	19.2	19.0	18.7	18.4	18.2
Ant.-post. thor.	19.0	18.8	18.6	18.4	18.2	18.0	17.8	17.7	17.5	17.3	17.1	16.9	16.7	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.1	14.9	14.7	14.5	14.3	14.1	13.9	13.8	13.6	13.4	13.2
Upper abdomen:																															
Xipho-epigastric	12.3	12.2	12.0	11.9	11.8	11.7	11.6	11.4	11.3	11.2	11.0	10.9	10.8	10.7	10.6	10.4	10.3	10.2	10.0	9.9	9.8	9.7	9.6	9.5	9.3	9.2	9.1	8.9	8.8	8.7	8.6
Trans. hypochond.	23.7	23.4	23.2	23.0	22.7	22.5	22.3	22.0	21.8	21.5	21.3	21.0	20.8	20.6	20.4	20.1	19.9	19.7	19.4	19.2	18.9	18.7	18.5	18.2	18.0	17.8	17.5	17.3	17.0	16.8	16.6
Ant.-post. hypochond.	18.4	18.2	18.0	17.8	17.6	17.5	17.3	17.1	16.9	16.7	16.5	16.4	16.2	16.0	15.8	15.6	15.4	15.3	15.0	14.9	14.7	14.5	14.3	14.1	14.0	13.7	13.5	13.3	13.1	12.9	12.7
Lower abdomen:																															
Epigastric-pubic	22.6	22.4	22.1	21.9	21.7	21.5	21.2	21.0	20.8	20.6	20.3	20.1	19.9	19.7	19.4	19.2	19.0	18.7	18.5	18.3	18.0	17.8	17.6	17.4	17.2	17.0	16.8	16.6	16.4	16.1	15.9
Trans. pelvic	29.8	29.5	29.2	28.9	28.6	28.3	28.0	27.7	27.4	27.1	26.8	26.5	26.2	25.9	25.6	25.3	25.0	24.7	24.4	24.1	23.8	23.5	23.	22.9	22.6	22.3	22.0	21.7	21.4	21.1	20.8
Extremities:																															
Upper extremity	51.3	50.8	50.3	49.7	49.2	48.7	48.2	47.7	47.2	46.8	46.3	45.7	45.2	44.7	44.2	43.7	43.2	42.7	42.1	41.6	41.1	40.6	40.1	39.6	39.0	38.6	38.0	37.5	37.0	36.5	36.0
Lower extremity	72.2	71.5	70.7	70.0	69.3	68.5	67.8	67.1	66.4	65.7	65.0	64.2	63.5	62.8	62.0	61.4	60.6	59.9	59.2	58.5	57.8	57.0	56.3	55.6	54.8	54.1	53.4	52.7	52.0	51.2	50.5
Compound:																															
Jugulopubic	48.3	47.8	47.3	46.8	46.4	45.5	45.0	44.5	44.0	43.5	43.0	42.6	42.1	41.6	40.1	39.7	39.2	38.7	38.2	37.7	37.2	36.8	36.3	35.8	35.3	34.8	34.3	33.9	33.4	32.9	32.4
Height, whole abdomen	34.9	34.5	34.2	33.9	33.6	33.3	33.0	32.7	32.4	32.1	31.8	31.5	31.1	30.7	30.4	30.0	29.6	29.2	28.9	28.5	28.2	27.9	27.5	27.2	26.8	26.5	26.1	25.8	25.4	25.0	24.7
Stature	155.0	153.4	151.9	150.3	148.7	147.1	146.6	145.0	143.5	141.9	140.4	138.8	137.3	135.7	134.2	132.6	131.1	129.5	128.0	126.4	124.8	122.2	120.7	119.1	117.6	116.0	114.5	112.9	111.4	109.8	108.3

TABLE II.—DEGREES FOR THE AVERAGE VENETIAN ADULT FEMALE. (VIOLA AND FICI.)—*Continued.*

DEGEEES OF EXCESS.

Degrees	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
VALUES.																
Trunk	24.3	25.0	25.7	26.5	27.3	28.1	29.0	29.8	30.7	31.4	32.3	33.2	34.2	35.1	36.1	36.8
Extremities	123.5	124.7	125.9	127.1	128.3	129.6	130.9	132.1	133.3	134.5	135.8	137.0	138.2	139.5	140.8	142.2
Thorax	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.3	8.5	8.8	9.0	9.3	9.5	9.8	10.0
Whole abdomen	17.7	18.2	18.7	19.3	19.9	20.5	21.2	21.8	22.4	22.9	23.5	24.2	24.9	25.6	26.3	26.8
Upper abdomen	5.3	5.5	5.7	5.8	6.0	6.2	6.4	6.6	6.8	6.9	7.0	7.3	7.5	7.7	7.9	8.0
Lower abdomen	12.4	12.7	13.0	13.5	13.9	14.3	14.8	15.2	15.6	16.0	16.5	16.9	17.4	17.9	18.4	18.8
MEASUREMENTS.																
Thorax:																
Sternal height	13.4	13.5	13.7	13.8	13.9	14.0	14.2	14.3	14.5	14.6	14.7	14.9	15.0	15.1	15.3	15.4
Trans. thor. diam.	26.0	26.2	26.5	26.8	27.0	27.3	27.5	27.8	28.0	28.3	28.6	28.8	29.1	29.4	29.6	29.9
Ant.-post. thor.	19.0	19.2	19.4	19.6	19.7	19.9	20.1	20.3	20.5	20.7	20.9	21.0	21.3	21.5	21.6	21.8
Upper abdomen:																
Xipho-epigastric	12.3	12.4	12.5	12.7	12.8	12.9	13.0	13.2	13.3	13.4	13.5	13.6	13.8	13.9	14.0	14.1
Trans. hypochond.	23.7	23.9	24.2	24.4	24.6	24.9	25.1	25.3	25.6	25.8	26.0	26.3	26.5	26.8	27.0	27.2
Ant.-post. hypochond.	18.4	18.6	18.7	18.9	19.1	19.3	19.5	19.7	19.9	20.0	20.2	20.4	20.6	20.8	21.0	21.1
Lower abdomen:																
Epigastric-pubic	22.6	22.8	23.0	23.3	23.5	23.7	24.0	24.2	24.4	24.6	24.9	25.1	25.3	25.5	25.8	26.0
Trans. pelvic	29.8	30.0	30.4	30.7	31.0	31.1	31.6	31.9	32.2	32.5	32.8	33.0	33.4	33.7	34.0	34.3
Extremities:																
Upper extremity	51.3	51.8	52.3	52.8	53.3	53.8	54.4	54.9	55.4	55.9	56.4	56.9	57.4	57.9	58.5	59.0
Lower extremity	72.2	72.9	73.6	74.3	75.0	75.3	76.5	77.2	77.9	78.6	79.4	80.1	80.8	81.6	82.3	83.0
Compound:																
Jugulopubic	48.3	48.8	49.3	49.7	50.2	50.7	51.2	51.7	52.2	52.6	53.1	53.6	54.0	54.4	55.0	55.5
Height whole abdomen	34.9	35.2	35.6	35.9	36.3	36.6	37.3	37.3	37.7	38.0	38.4	38.7	39.4	39.4	39.8	40.1
Stature	155.0	156.5	158.1	159.6	161.2	162.7	164.3	165.8	167.4	168.9	170.5	172.0	173.6	175.1	176.7	178.2

Degrees	+16	+17	+18	+19	+20	+21	+22	+23	+24	+25	+26	+27	+28	+29	+30
VALUES.															
Trunk	37.8	38.0	39.9	40.9	41.9	43.1	44.1	45.2	46.2	47.4	48.7	49.7	50.9	52.2	53.5
Extremities	143.2	144.4	145.6	146.9	148.1	149.3	150.6	151.8	153.1	154.3	155.5	156.7	158.0	159.2	160.4
Thorax	10.2	10.6	10.8	11.1	11.4	11.7	12.0	12.3	12.5	12.8	13.2	13.5	13.8	14.0	14.5
Whole abdomen	27.6	27.4	29.8	29.8	30.5	31.4	32.1	32.9	33.7	34.6	35.5	36.2	37.1	38.1	39.0
Upper abdomen	8.4	8.6	8.8	9.0	9.2	9.5	9.7	9.9	10.2	10.4	10.7	10.9	11.2	11.5	11.8
Lower abdomen	19.2	19.8	20.3	20.8	21.3	21.9	22.4	23.0	23.5	24.2	24.8	25.3	25.9	26.6	27.2
MEASUREMENTS.															
Thorax:															
Sternal height	15.5	15.7	15.8	15.9	16.0	16.2	16.3	16.5	16.6	16.7	16.9	17.0	17.1	17.2	17.4
Trans. thor. diam.	30.1	30.4	30.7	30.9	31.2	31.4	31.7	32.0	32.2	32.5	32.7	33.0	33.3	33.5	33.8
Ant.-post. thor.	22.0	22.2	22.4	22.6	22.8	23.0	23.2	23.4	23.5	23.7	23.9	24.1	24.3	24.5	24.7
Upper abdomen:															
Xipho-epigastric	14.3	14.4	14.5	14.6	14.8	14.9	15.0	15.1	15.2	15.4	15.5	15.6	15.7	15.9	16.0
Trans. hypochond.	27.5	27.7	27.9	28.2	28.4	28.7	28.9	29.1	29.4	29.6	29.8	30.0	30.3	30.6	30.8
Ant.-post. hypochond.	21.3	21.5	21.7	21.9	22.0	22.2	22.4	22.6	22.8	23.0	23.2	23.3	23.5	23.7	23.9
Lower abdomen:															
Epigastric-pubic	26.2	26.5	26.7	26.9	27.1	27.4	27.6	27.8	28.0	28.3	28.5	28.7	28.9	29.2	29.4
Trans. pelvic	34.5	34.8	35.1	35.4	35.7	36.0	36.3	36.6	36.9	37.2	37.5	37.8	38.1	38.4	38.7
Extremities:															
Upper extremity	59.5	60.0	60.5	61.0	61.5	62.0	62.6	63.0	63.6	64.1	64.6	65.1	65.6	66.1	66.6
Lower extremity	83.7	84.4	85.1	85.9	86.6	87.3	88.0	88.8	89.5	90.2	90.9	91.6	92.4	93.1	93.8
Compound:															
Jugulopubic	56.0	56.5	57.0	57.5	58.0	58.4	58.9	59.4	59.9	60.4	60.8	61.3	61.8	62.3	62.8
Height whole abdomen	40.5	40.8	41.2	41.5	41.9	42.2	42.6	42.9	43.3	43.6	44.0	44.3	44.7	45.0	45.4
Stature	179.8	181.3	182.9	184.4	186.0	187.5	189.1	190.6	192.2	193.7	195.3	196.8	198.4	199.9	201.5

TABLE II*a*.—BIOMETRIC AVERAGES FROM BIRTH TO THE AGE OF ELEVEN (BERGHINZ).

Age.	New-born.		1		2		3		4		5		6		7		8		9		10		11		Average adult (Viola-Fici) (20)	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Index values:																										
Extremities	33.240	32.400	45.000		55.10	54.25	65.20	63.50	71.20	69.45	77.20	75.40	82.70	81.32	88.20	87.25	93.30	92.80	98.40	98.50	103.10	103.00	107.80	107.50	135.5	123.5
Trunk	1.708	1.656	4.091		6.17	6.01	8.24	7.94	9.13	8.79	10.01	9.64	10.76	10.30	11.50	10.95	12.32	11.84	13.14	12.75	14.39	13.63	15.63	14.51	28.40	24.3
Thorax	0.519	0.513	1.061		1.61	1.54	2.17	2.01	2.39	2.21	2.61	2.40	2.88	2.61	3.13	2.82	3.28	3.03	3.42	3.23	3.83	3.41	4.24	3.60	8.60	6.6
Whole abdomen	1.189	1.143	3.030		4.55	4.48	6.08	5.92	7.74	6.59	7.40	7.23	7.88	7.68	8.36	8.12	9.04	8.82	9.71	9.51	10.55	10.21	11.39	10.92	19.80	17.7
Upper abdomen	0.510	0.496	1.337		1.92	1.87	2.50	2.39	2.74	2.60	3.00	2.81	3.23	2.98	3.46	3.16	3.68	3.44	3.88	3.71	4.22	3.92	4.57	4.13	7.60	5.3
Lower abdomen	0.679	0.647	1.693		2.63	2.62	3.59	3.54	3.99	3.98	4.40	4.42	4.65	4.69	4.90	4.95	5.36	5.37	5.83	5.79	6.32	6.49	6.81	6.78	12.20	12.4
Weight	3.400	3.185	9.000		11.35	11.07	13.70	13.15	15.37	14.67	17.05	16.20	19.27	18.22	21.50	20.25	23.60	22.77	25.70	25.50	28.35	27.35	31.00	29.20	—	—
Height	50.230	49.000	71.400		81.70	80.60	92.00	89.80	98.45	96.50	104.90	103.70	110.70	109.10	116.50	114.50	121.20	120.40	126.00	126.40	131.60	130.20	137.20	134.80	168.0	155.0
Arms outstretched	49.210	48.500	68.300		78.95	78.30	89.60	88.30	96.65	94.80	103.70	101.30	109.80	107.10	116.00	113.00	121.00	119.70	126.00	126.50	131.60	130.90	137.20	135.30	173.5	157.9
Upper extremity	14.420	13.800	19.000		23.30	23.05	27.60	27.10	30.15	29.30	32.70	31.50	35.10	33.60	37.50	36.15	39.45	38.32	41.40	40.50	43.12	42.50	44.85	44.50	56.5	51.3
Lower extremity	18.820	18.600	26.000		31.80	31.20	37.60	36.40	41.05	40.15	44.50	43.90	47.60	47.50	50.70	51.10	53.85	54.55	57.00	58.00	60.00	60.50	63.00	63.00	79.0	72.2
Vert.-ischiat. length	32.990	32.400	44.100		48.20	47.95	52.30	51.80	55.40	54.75	58.50	57.70	61.00	59.67	63.50	61.65	65.40	64.42	67.30	67.20	70.02	68.85	72.75	70.50	—	—
Thoracic circumference	33.200	32.000	42.500		47.90	47.00	53.30	51.50	54.90	53.05	56.50	54.60	57.70	56.05	58.90	57.50	60.45	59.07	62.00	60.65	63.85	61.95	65.70	63.25	87.0	80.0
Trans. thor. diam.	9.060	8.900	13.400		15.35	15.15	17.30	16.90	17.80	17.20	18.30	17.50	18.70	18.02	19.10	18.55	19.54	19.02	19.99	19.50	20.70	19.97	21.40	20.45	27.7	26.0
Ant.-post. thor. diam.	8.960	8.600	11.000		12.30	12.20	13.60	13.40	13.95	13.65	14.30	13.90	14.55	14.00	14.80	14.10	14.85	14.30	14.90	14.50	15.45	14.65	16.00	14.80	20.0	19.0
Sternal height	6.400	6.400	7.200		8.20	8.05	9.20	8.90	9.60	9.40	10.00	9.90	10.55	10.35	11.10	10.80	11.30	11.12	11.50	11.45	11.95	11.97	12.40	11.90	15.6	13.4
Xipho-epigast. length	5.600	5.500	7.200		8.20	8.05	9.20	8.90	9.75	9.45	10.30	10.00	10.85	10.47	11.40	10.95	11.75	11.47	12.10	12.00	12.50	12.20	12.90	12.40	14.4	12.3
Xipho-umbil. length	9.100	8.900	10.80		12.45	12.25	14.10	13.70	14.65	14.33	15.20	14.97	15.60	15.31	16.00	15.65	16.55	16.40	17.10	17.15	17.67	17.32	18.25	17.50	20.5	19.8
Epigast.-pubic length	8.500	8.400	10.50		12.30	12.30	14.10	14.10	14.60	14.85	15.10	15.60	15.40	16.02	15.70	16.45	16.45	16.95	17.20	17.45	17.82	17.94	18.45	18.40	21.0	22.6
Umbil.-pubic length	5.000	5.000	6.90		8.05	8.10	9.20	9.30	9.70	9.97	10.20	10.63	10.65	11.19	11.10	11.75	11.65	12.02	12.20	12.30	12.62	12.80	13.05	13.35	14.7	15.1
Hypochond. circumf.	33.400	32.000	44.00		49.40	49.15	54.80	54.30	56.15	54.90	57.50	55.50	58.05	56.00	58.60	56.50	59.30	58.05	60.00	59.60	61.97	60.40	63.95	61.20	82.5	71.2
Bisiliac diam.	8.500	8.200	12.50		14.40	14.30	16.30	16.10	17.20	17.06	18.10	18.03	18.70	18.61	19.30	19.20	20.05	19.95	20.80	20.70	21.55	21.45	22.30	22.20	29.0	29.8
Trans. hypochond. diam.	9.700	9.600	14.40		15.90	15.80	17.40	17.20	17.75	17.55	18.10	17.90	18.55	18.15	19.00	18.40	19.35	18.85	19.70	19.30	20.40	19.70	21.10	20.10	26.5	23.7
Ant.-post. hypochond. diam.	9.400	9.4000	12.90		14.17	14.15	15.44	15.40	15.67	15.50	15.91	15.60	15.95	15.65	16.00	15.70	16.15	15.87	16.30	16.05	16.55	16.27	16.80	16.60	20.0	18.4
Maximum biparietal diam.	9.500	9.000	13.00		13.38	13.25	13.76	13.50	14.00	13.70	14.20	13.90	14.30	14.05	14.40	14.20	14.45	14.25	14.50	14.30	14.57	14.35	14.65	14.40	—	—
Naso-occipital diam.	11.700	10.200	15.10		16.05	15.75	17.00	16.40	17.15	16.66	17.20	16.93	17.47	17.14	17.65	17.35	17.72	17.37	17.80	17.40	17.95	17.52	18.10	17.65	—	—

With this end in view we first calculate a numerical index which is the exponent of the total quantitative development of the trunk, and which we call the *trunk value.* It is the result of adding two component values, the *thoracic* and the *abdominal;* the latter, in its turn, is found by adding the *upper* and *lower* abdominal values. Next the total numerical index of the quantitative development of the limbs is calculated. This *limb value* is the sum of the longitudinal development of the upper limb and lower limb. (The thickness of the limbs is best ignored, since it depends greatly upon the state of nutrition of the individual, which is variable, while the length is based upon the measurements of the skeleton, which do not vary). In the calculation of the cavity values (thoracic, upper and lower abdominal) the numerical indices are obtained by multiplying the vertical diameter of each cavity by its transverse diameter, and then multiplying this product by the antero-posterior diameter. (For the lower abdomen we use the hypochondriac antero-posterior diameter, since we know that in normal persons the anterior wall of the abdomen is vertical.)

In the study of human individuality the following composite measurements are added, for the sake of greater detail, to those mentioned above:

11. Jugulo-pubic: Sternal height+xipho-epigastric+epigastric-pubic.
12. Jugulo-epigastric: Sternal height+xipho-epigastric, that is, the total thoracic height.
13. Total abdominal height: xipho-epigastric height+pubic-epigastric.
14. Stature: Vertico-jugular+sternal height+total abdominal height+length of lower limb.

Last of all we append the weight of the body to all these measurements.

If we compare the lineal measurements and the indices or values found in individuals with the numbers in Viola's tables (see Tables I and II), in which the zero column represents the normal averages and the other columns the number of degrees of deviation above or below the average measurements (corresponding to constitutions which exceed or fall short of the average in their proportional measurements), and if we suppose each degree to be equal to one-hundredth of the average measurement, we can easily recognize by how many hundredths, or degrees, the measurement found in the individual exceeds or falls short of the other measurements in the same subject, in either an absolute or a relative sense. The left hand portion of each table shows the degrees of deficiency, the right hand portion the degrees of excess, in development.

When the value of a given lineal measurement is not within the limits of the tables, owing to an excess or deficiency in development, we can at once find its corresponding degree by using the following formula: $\frac{i - m}{m} \times 100 = x$, in which i represents the individual measurement, m the average normal value and x the degree we are looking for.

In calculating the body weight of the individual we use the Bouchard tables (Table III) or those published later by Rautmann (Table IV) for purposes of comparison. These give the average normal weight in relation to stature.

But in addition to stature we must keep in mind, in estimating individual weight, the fact that in megalosplanchnics and brachymorphic individuals the weight is usually somewhat exaggerated, while in microsplanchnics or dolichomorphic types it is usually somewhat lower than in the average type,[1] and also that at certain periods of life the weight is generally lower (prepuberal period) or higher (postpuberal period) in its relation to stature. Having established the proportional difference in the weight of the individual we are studying as compared with the normal weight, we calculate the percentage of ponderal excess or deficiency by making his weight equal 100 kg.

The measurements of the individual thus obtained are completed by the investigation of certain descriptive morphological characteristics suggested by Viola, as follows: (1) Height of the forehead; (2) upward and backward slope of the forehead; (3) protrusion of the supra-orbital ridges; (4) prominence of the malar bones; (5) characters of facial infantilism; (6) length of the neck; (7) shape of thorax; (8) position of thorax at rest; (9) slope of the line of the shoulders outward and downward; (10) slope of the free costal

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[1] According to Brugsch, for statures up to 165 cm. the weight is equal to the number of kilos indicated by the stature less 100; for statures between 165 and 175 cm., by the stature less 105; between 175 and 185 cm., by the stature less 110. According to Kaup, the index of the relationship between weight and stature is expressed by the ratio *weight to square of stature.* The weight varies as the square of the stature, while the surfaces of transverse sections of the body vary as the square root of the simple bodily lengths. From these facts there originate two indices, $\frac{W}{L^2}$ and $\frac{2}{L}$ (where 2 = average transverse section of the body).

TABLE III.—AVERAGE NORMAL WEIGHT IN RELATION TO STATURE (CONSIDERED IN DECIMETERS, ACCORDING TO BOUCHARD.)

Stature, dcm.	Weight, kg.	Stature, dcm.	Weight, kg.	Stature, dcm.	Weight, kg.	Stature, dcm.	Weight, kg.
14.0	45.81	15.6	59.50	17.1	71.39	18.6	81.39
14.1	46.66	15.7	60.38	17.2	72.07	18.7	82.07
14.2	47.50	15.8	61.26	17.3	72.78	18.8	82.76
14.3	48.36	15.9	62.15	17.4	73.48	18.9	83.43
14.4	49.18	16.0	62.91	17.5	74.11	19.0	84.11
14.5	50.05	16.1	63.76	17.6	74.77	19.1	84.79
14.6	50.88	16.2	64.61	17.7	75.40	19.2	85.48
14.7	51.75	16.3	65.46	17.8	76.04	19.3	86.17
14.8	52.58	16.4	66.26	17.9	76.77	19.4	86.85
14.9	53.45	16.5	67.06	18.0	77.42	19.5	87.48
15.0	54.32	16.6	67.79	18.1	78.08	19.6	88.08
15.1	55.21	16.7	68.55	18.2	78.73	19.7	88.81
15.2	56.09	16.8	69.30	18.3	79.40	19.8	89.32
15.3	56.93	16.9	69.98	18.4	80.00	19.9	89.87
15.4	57.78	17.0	70.69	18.5	80.73	20.0	90.40
15.5	58.64						

TABLE IV.—H. RAUTMANN'S TABLE OF ANTHROPOMETRIC VALUES.

Stature, cm.	Normal relations between weight, perimeter of the thorax, transverse diameter of the heart and stature.		
	Weight, kg.	Perimeter of thorax, cm.	Diameter of heart, cm.
155.5–159.5	54–60	80–86	12.0–13.4
159.5–163.5	54–62	81–87	12.3–13.8
163.5–167.5	57–65	81–87	12.5–14.1
167.5–171.5	60–68	82–88	12.6–14.1
171.5–175.5	64–72	83–89	12.6–14.2
175.5–179.5	66–74	84–90	12.7–14.2
179.5–183.5	68–76	86–92	12.7–14.2

margin downward and forward; (11) slope of the cartilaginous arches outward and downward; (12) level of the jugular notch in relation to the second dorsal vertebra; (13) slope of sternum downward and forward; (14) length of the manubrium sterni; (15) protrusion of Louis's angle; (16) breadth of the epigastric angle; (17) breadth of the hypochondria; (18) total forward inclination of the intercostal spaces and of the ribs; (19) breadth of the first two intercostal spaces; (20) breadth of the other intercostal spaces; (21) breadth of the lateral thoracic regions; (22) protrusion of the internal margin and of the lower angle of the scapulæ; (23) prominence of the seventh cervical vertebra; (24) Stiller's sign (the tenth and sometimes also the ninth rib free on the anterior end); (25) exaggeration of the lumbar curvature; (26) height of the wrist-joint (arms hanging down) above the upper margin of the symphysis pubis; (27) curve of the sole of the foot.

In Viola's method the cephalic extremity is purposely overlooked because the external measurements of the head and neck can hardly be of any clinical use in internal medicine.

However, the morphological study of the head and neck may be a useful complement to the biotypological judgment of the individual, though in classifying human types one must not follow Sigaud and his pupils in giving exaggerated importance to the shape of the face and skull. It is indeed evident that a big skull or a large face, for example, may be found on a small and slender body as well as on a massive one.

* * *

Viola's law offers larger practical possibilities if we study not only the simple relationship of development between the mass and the proportions of the organism as a whole (which means practically between the trunk and the extremities), between the development in width and in length, but also the relationship between the development of the mass and the proportions of the organism in its separate segments, such as the thorax, abdomen, hand, foot, skull, face, etc.

When we study the morphology of the separate parts of the body by the serial method under the guidance of this directing principle we reach the same fundamental distinction of a brachymorphic and a dolichomorphic type—a type with a mass development preponderating over the morphological differentiation, and one with a deficiency of mass as compared with the development of proportions. These represent characteristic deformations of the average normal type in which mass and proportions, width and length, appear in harmonious reciprocal relationship. Thus we may find a longitypical (dolichomorphic), normotypical (eumorphic) or brachytypical (brachymorphic) thorax, a longitypical (dolichomorphic), normotypical (eumorphic) or brachytypical (brachymorphic) hand or foot, etc.[1]

In normal ontogenesis we find the morphological differentiation of these segments of the body evolving in such a way that their relative mass is continually being reduced; that is to say, as this is distributed in length, the thick, heavy form of childhood diminishes and the slender, elegant form characteristic of adult age asserts itself more and more. Accordingly, the brachymorphic aspect of a given bodily segment may be interpreted in the adult as a characteristic of hypoevolutism, and the dolichomorphic aspect as one of hyperevolutism, even if these characteristics are limited to a given section of the body, independently of the general bodily outline of the subject.

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[1] For the terminology, *dolichomorphic, eumorphic* and *brachymorphic*, adopted by us in place of *longilineal, normotypical* and *brevilineal*, see note on page 36.—S. N,

In connection with these morphological anomalies which predispose to pulmonary tuberculosis we shall see the importance of *dolichomorphy,* even when localized in the thorax alone, in creating a tendency in the respiratory apparatus toward tuberculous infection. In addition to this, modern investigations of the tendency toward gastro-intestinal dyspepsia and splanchnoptosis show the strongly predisposing importance of abdominal dolichomorphy. In the case of the internal organs, too, such as the heart or the stomach, the recognition of a brachymorphic or dolichomorphic state as an index of morphological hypoevolutism or hyperevolutism, respectively, is of great value as an expression either of a functional immaturity, that is, the persistence of functional attitudes belonging to an earlier epoch, or conversely, of the presence of attributes belonging to an epoch more advanced in development.

With regard to the judgment of these partial organic constitutions, Viola's law enables us to consider another rich field of application to pathology, namely, that derived from a study of the respective developmental relationships not only between the total mass and its proportions, but also between the various tissues which enter into the constitution of the organ itself. We know that each organ consists of a parenchymal and a mesenchymal tissue.[1] In our time the latter has been steadily acquiring greater physiological importance as a tissue designed for the trophic or vegetative functions of the organism, particularly for the local trophic functions in relation to the nutrition of the so-called noble or functionally differentiated elements of the organs. We know, for example, the great importance assigned to neuroglia in the trophism of the nervous elements of the cerebrospinal axis, the importance that the so-called reticulo-endothelial apparatus (Aschoff) of the liver and hemolymphopoietic organs seems to have in connection with the metabolism of certain substances (lipoids, pigments), and the importance of the interstitial cells of the testis and ovary in the spermogenetic and ovulogenetic generative tissue.

On the other hand, the investigations of A. Fischel show that there exists a strict morphogenetic subordination of the embryonal connective tissue of the organs to the action of the parenchymal epithelium of these same organs.

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[1] It is, perhaps, not premature to classify, for clinical purposes, all morbid processes as parenchymal and mesenchymal.

Now it is certain that, as the organ gradually evolves toward the adult structure, the connective tissue, which is very abundant in early life, slowly diminishes; as De Giovanni has already pointed out, the persistence in the adult organ of a great number of mesenchymal cells and a large amount of interstitial lymph is a sign of organic immaturity and of true hypoevolutism.

If, for the reasons cited, we conceive of the organ's mesenchymal tissues as designed for the vegetative or anabolic functions of the organ itself, and the parenchymal tissues as designed for the organ's function of producing energy, we can probably also assume the existence of an inverse ratio in the development of the two tissues, equal to that which Viola has found to exist between the two great organic systems, the vegetative and the animal, the anabolic and the catabolic. In other words, the more the connective interstitial tissue preponderates in an organ, the less developed is the specific functional tissue, and *vice versa.*

This would enable us to understand the primary reason for constitutional inadequacy localized in separate organs. Such inadequacy might depend on an excessive development of this trophic tissue of the organ itself, which would result in an habitual nutritive plethora of the organ, to the detriment of the parenchymal development; this would lead to a great expansion of the functional effort of the parenchyma through overabundance of reserve material; further results would be a tendency to abuse of that function and a liability to the accumulation of waste material from the parenchymal cells in the oversized spaces of the interstitial connective tissue, which would facilitate the clogging of this interstitium by harmful inorganic and bacterial agents, leading to a disposition to chronic interstitial inflammation, to fibrous transformation of the connective tissue itself and to the premature aging of the organ.

But, on the other hand, the organ's constitutional inadequacy may depend upon a deficient development of the interstitial connective tissue, which will, on this account, possess anabolic or trophic functions insufficient for the functioning parenchyma in comparison with the requirements of its advanced morphological and functional evolution. Hence, on the one hand, the organ has a scarcity of reserve materials and, on the other, there is need for the rapid and abundant consumption of such materials in proportion to the degree of perfection attained by the function; the result is the ready appearance of phenomena of exhaustion, of fatigue, that is, of miopragia (Potain) or of limited functional effort.

In the following chapter we shall see better how the two antithetic structural states previously delineated in reality coincide and are as a rule, if not always (owing to the crossing of hereditary influences), framed in the two ectypes of general constitution which Viola has distinguished on the basis of the same reorganizing principle, the proportional development of the vegetative system as compared with the system of relation the megalosplanchnic ectype, which we may also term hypervegetative, and the microsplanchnic, which we may call hypovegetative.

In connection with constitutional inadequacies of the various apparatus, we shall also see that the concepts just brought out with regard to the ontogenetic imbalance between the mesenchymal tissue and the parenchymal may serve to explain the particular susceptibility of certain organs to disease, their tendency to sclerosis, to symptoms of early aging and abiotrophy.

Today it is more difficult to state just what value, in the production of constitutional strength or inadequacy (either in the total constitution or in the partial constitutions of the separate organs), should be assigned to a simple deficiency in the total mass of the entire organism or in the mass of the separate organs, where there has been a normal morphological evolution and where perfectly eurhythmic proportions exist.

There is no doubt that the original evolutional spurt of the organism or of the separate organs may from the start be deficient or excessive, and yet we may have a just distribution of the two resultants of such a spurt, namely, the ponderal and the morphological, so that the result will be *eurhythmic microsomic* and *megalosomic* individuals. Although we are dealing here with exceptional cases, such as are discussed in the studies of E. Levi upon *heredofamilial essential microsomia*, we conclude that these eurhythmic nanisms are often met in regions and families where infantilism, especially that of thyroid origin, is frequent. We find this same degenerative environment in those families in which the very rare cases of eurhythmic gigantism occur.

When we are not dealing with ethnic characteristics, nanism and gigantism always represents extreme deviations from the average type, and, as such, cannot be regarded as other than anomalous or weak constitutions. This concept may be applied *a fortiori* to the individual organs, which, if excessively small or large, even though normal in form and proportions, always represent errors of morphological correlations with the other parts of the body, and hence constitute causes of constitutional inadequacy in the respective organs.

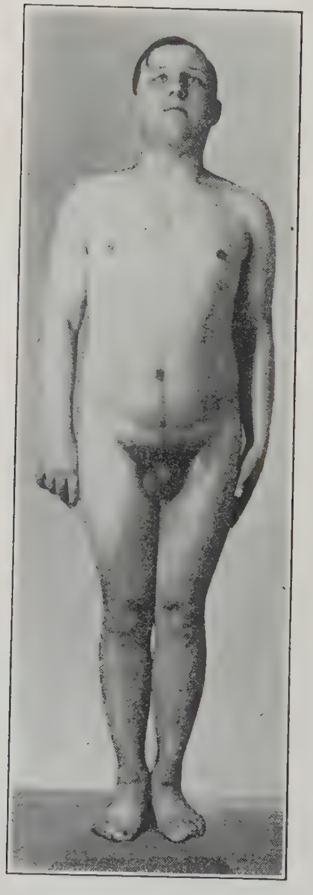

FIG. 1.—Brachymorphic.

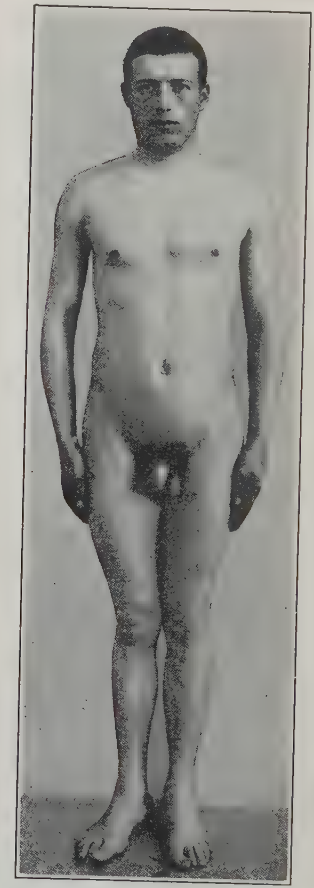

FIG. 2.—Eumorphic.

We must now resolve the question of our present concept of *normal individuals* and *healthy individuals*. Can we identify these two terms with one another? I do not think so.

Normality, in a statistical sense, is the mass of the average or central values—morphological, functional and psychological—of the curve of variability. But it is evident that, for us who are clinicians and biologists, this average *human type*—an abstract and ideal type that does not exist in Nature—is not the only type of the healthy man. Many healthy subjects, we may even say the universality of healthy individuals, stray *more or less* from the statistical *average normal* type. If it is true, as Viola has well shown, that the statistical average type is to an exquisite degree the eurhythmic and beautiful type which wonderfully corresponds to the proportions of the Apollo Belvedere or the Doryphoros of Polycletus (MacAuliffe), it is no less true that, from the point of view of health and of functional robustness, wide deviations from the average type may exist. That is to say, individuals straying considerably from the normal average type—although within certain limits that can-

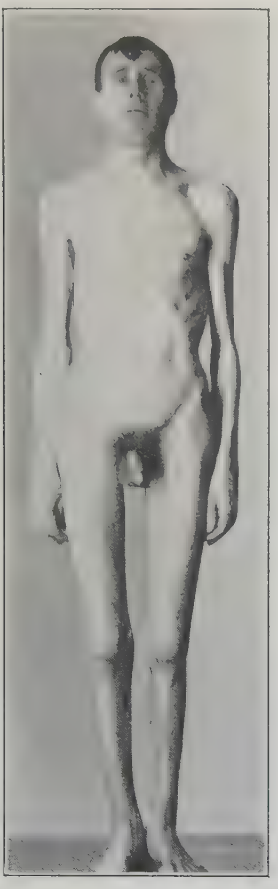

Fig. 3.—Dolichomorphic.

Figs. 1, 2 and 3.—Fundamental human types: Dolichomorphic and brachymorphic.

not yet be established for all cases by bodily measurements—may nevertheless be healthy and functionally resistant. Accordingly, clinical normality, or health, and statistical normality do not necessarily coincide; on the contrary, it is perhaps not overbold to formulate the opinion, which we have gathered from the clinical study of many subjects who were the nearest to the average type or to the type of Greek beauty, that both men and women possessing the most ideal figures very often present remarkable anomalies, especially in the genital and nervous sphere. In the same way it has been observed that children with angelic forms are frequently affected with status thymicus, and are the ones most exposed to

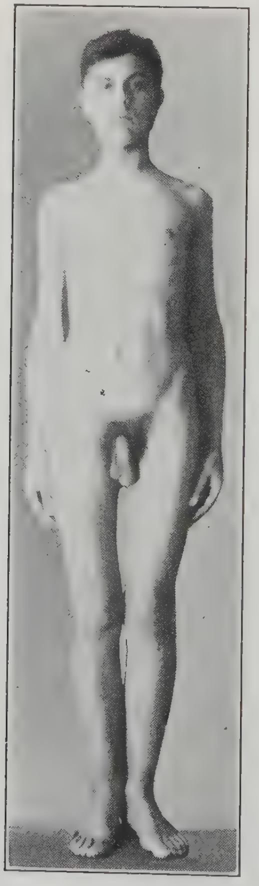

Fig. 4.—Hyperthyroid variety.

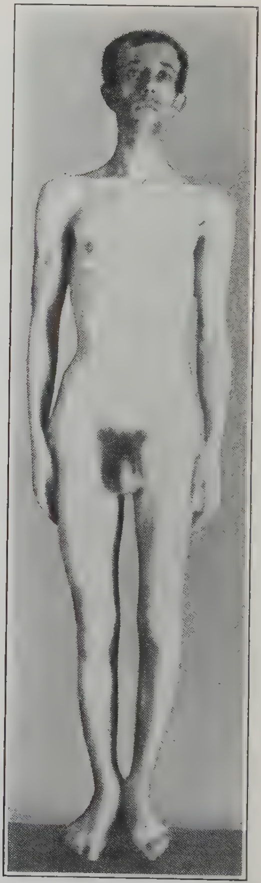

Fig. 5.—Hypoparathyroid spasmophilic variety.

death following diphtheria, tuberculous meningitis and other infections. On the other hand, recent studies of Boldrini, carried out on the constitutional type of those soldiers who during the World War showed the greatest resistance to diseases to which all constitutional types were equally exposed, establish the fact that the most resistant is a slightly disproportioned type, with predominance of the trunk values over those of the limbs, and with the lower extremities rather short. Boldrini identifies this with our hypergenital type (page 206).

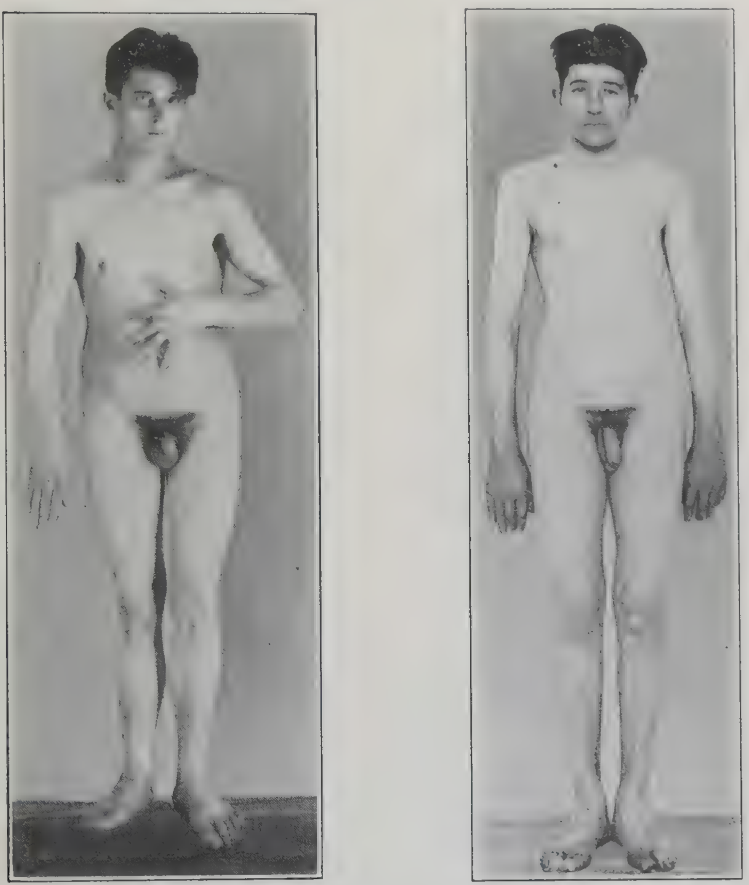

FIG. 6.—Hyperpituitary variety. FIG. 7.—Hypogenital variety.

FIGS. 4, 5, 6 and 7.—Endocrine varieties of the dolichomorphic type.

Hence, within certain degrees of anthropometric variability (degrees which do not, however, go so far as the extremes of the serial curve) it is possible to assume that an individual can remain healthy and also develop a great resistance against environmental agents. The criterion for this judgment of individual health or *responsivity* (as Grote calls it) cannot be purely anthropometric, but must be clinical. In other words, it must include the whole mass of anamnestic and objective investigations by means of which the clinician is enabled to estimate the dynamic side of constitution, and it constitutes the empirical observation of how the individual reacts to those conditions which require the largest development of all his energies and aptitudes.

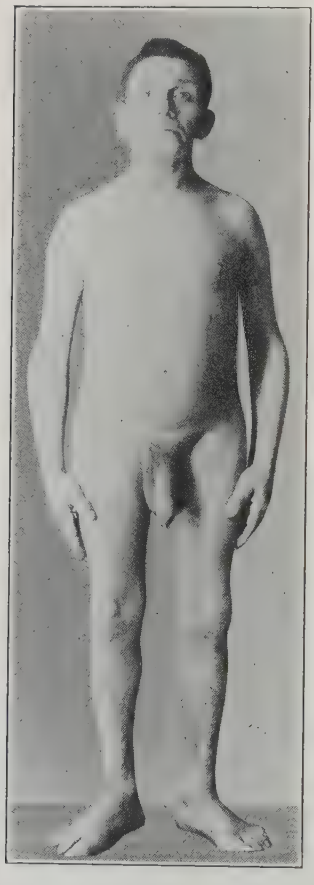

Fig. 8.—Hypothyroid variety.

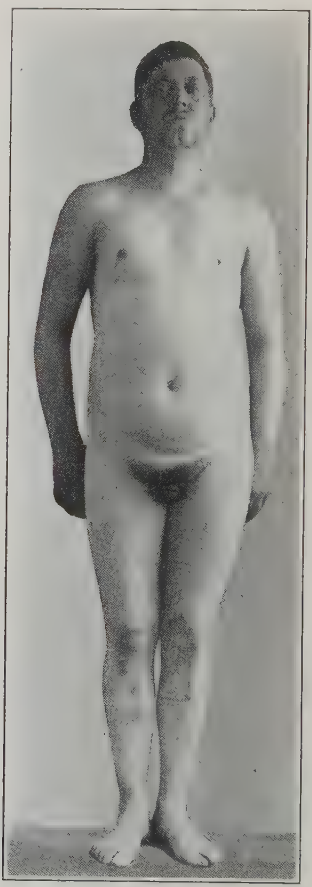

Fig. 9.—Hypopituitary variety.

The anthropometric statistical criterion, however, always remains an excellent guide for orientation in the prognostic judgment of individual constitution, and when the morphological biotype strays too far from average values—when, for instance, one has to deal with megalosplanchny or megalosomia and exaggerated brachymorphy, or *vice versa*, with excessive microsomia and dolichomorphy—then the subject can almost with certainty be considered anomalous; not a healthy, but still not a sick, individual, as it is necessary to distinguish carefully the anomaly and the preclinical state from the disease or *true morbid process* which may for slight reasons (but which does not necessarily) arise from the anomalous soil.

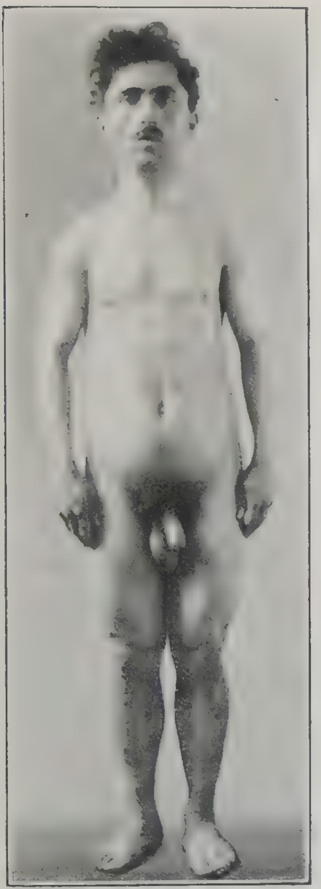

FIG. 10.—Hypergenital variety.

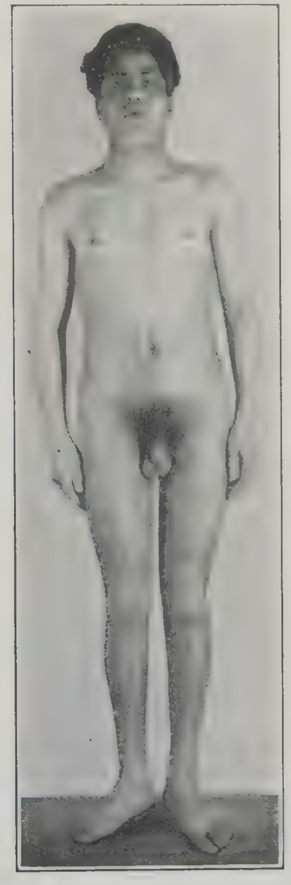

FIG. 11.—Hyperadrenal variety.

FIGS. 8, 9, 10 and 11.—Endocrine varieties of the brachymorphic type.

CHAPTER III.

SEMIOLOGICAL ANALYSIS OF CONSTITUTION AND CRITERIA FOR THE CLASSIFICATION OF THE INDIVIDUAL BIOTYPES.

Three aspects of constitution: Morphological, dynamic-humoral, psychological—The morphological criterion—Local ectypes based on the proportional development of the four principal organic systems—Hyperevolute and hypoevolute types—Brugsch's index—Autochthonous characteristics of the four systems—The dynamic-humoral criterion (neurochemical): The endocrine dominant—Viola's microsplanchnic and megalosplanchnic types in relation to the endocrine formula—Two great hormonic groups—Vegetative and animal neurotonus—Pharmacodynamic tests—The sympathetic an excito-catabolic system, the parasympathetic an excito-anabolic—The psychological criterion—The instinctive-affective and intellective-volitive types—Schizoid and cycloid temperaments—Correlations between soma and psyche—Variants of the two great ectypes.

We already know that the anthropological clinical study of constitution can no longer be limited to a purely morphological study, nor is it possible, on the other hand, to separate the dynamic side from the morphological, nor the psychical from the physical. As we have said, it is only through the synthetic unitary concept of constitution, which presents three aspects, morphological, dynamic-humoral and psychical, that we are enabled to grasp the individual personality as a whole in health and in disease. Today, therefore, the semiological criterion for the study of individual constitution may present three aspects.

THE MORPHOLOGICAL CRITERION.

We start with the morphological criterion, which, on account of the ease with which it can be studied, even now still leads in practice. We have already learned the guiding principle and the method followed by our school—the search for the individual's morphological index, given, according to Viola, by the relation between the trunk and limbs, by means of which we are able to classify the individual as: (1) harmonious, or *normosplanchnic* or *eumorphic;* (2) *megalosplanchnic* or *brachymorphic* or *hypervegetative;*

(3) *microsplanchnic* or *dolichomorphic* or *hypovegetative;* (4) of an *impure* or *mixed type* in which characteristics of the megalosplanchnic and microsplanchnic types are combined, owing to the crossing of hereditary influences or, more rarely, to exogenous factors. Besides the relation between the trunk and limbs it is also necessary to estimate the whole bodily mass, in order to note whether the subjects in question are hyposomic, normosomic or hypersomic.

From Viola's observations we find that fully 50 per cent of all individuals in a given ethnical group are mixed types, and that only 50 per cent can be strictly classified as being of either eumorphic, brachymorphic or dolichomorphic type.

It is precisely because of the frequency of these impure or mixed types of individuals, in which we can discover *local ectypes* out of harmony with the general bodily habitus, that I believe it necessary to establish in the individual, in addition to Viola's anthropometric formula, the degree of proportional development of four great organic apparatus, which often present an *autochthonous* behavior, an independence of correlation with the external anthropometry, as Brugsch and Kaup have also recently assumed. These are the cardio-vascular, the musculo-skeletal, the sexual and the hemolymphopoietic apparatus.

The examinations that I have conducted of late years have convinced me that, for purposes of clinical medicine, no morphological definition of constitution is complete without an estimate of the degree of proportional development of these four great organic systems, as compared with the bodily mass; otherwise the conclusions obtained by simple external anthropometry would very often appear to us paradoxical.

In studying the development of the cardio-vascular apparatus, as Beneke and De Giovanni have taught us and as von Brugsch has again recently pointed out, we must first find the absolute size of the heart *in toto,* and its size relative to the general bodily mass. Besides this development of mass, however, the morphological evolution of the organ must of necessity be estimated—its form (given essentially by the proportional development of its left and right portions and by the development of the aorta and pulmonary artery) and also its location.

We have today only approximate methods for estimating the size of the heart, the two most recent of which are those of Geigel and von Brugsch. Both take issue with the inaccurate supposition that the heart is comparable to a sphere. Geigel calculates the size by taking the surface (f) of the orthodiagraphic cardiac outline (silhouette) and using the formula V (volume) $= f\frac{3}{2} \times \frac{4}{3\sqrt{\pi}}$ or, more simply, $V = f\frac{3}{2} \times \frac{3}{4}$.

This value divided by the number of kilograms of the individual's body weight gives the size of the heart per kilogram, or the approximate *cardiac quotient*, which varies between 15 and 23. Below 14 the heart is too small and above 23 it is too large.

Brugsch, on the other hand, takes one-half the sum of the two transverse semidistances from the median line (transverse cardiac diameter) in the teleroentgenographic figure of the heart. From this value, which is the radius r of the cardiac sphere, he estimates the size by means of the formula $V = r^3 \times \frac{4}{3}\pi$. (*Note.*—$\frac{4}{3}\pi =$ about 4.18.) This virtual absolute size of the living heart, which in the normal adult hovers around 900 cc., is related not to the weight of the body but to the size of the trunk. Regarding the trunk as a cylinder whose height is the jugulopubic distance and whose base the thoracic perimeter, Brugsch calculates the size by the following formula:

$$\text{Size of trunk} = \frac{\text{jugulopubic distance} \times \text{circumference}^2}{4\pi}$$

$$\frac{\text{Size of heart}}{\text{Size of trunk}} = \text{index of cardiac development.}$$

which in the adult male varies between a maximum of $\frac{1}{33}$ and a minimum of $\frac{1}{50}$. This minimum is regarded as physiological in the adult female and in adolescents. Below $\frac{1}{50}$ we have to do with a small heart and above $\frac{1}{33}$ with a heart pathologically large.

But the method of Geigel and that of Brugsch are both imperfect. In Italy Rossi and Perona have established the orthodiagraphic surface of the heart, following Moritz and Dietlen, in both sexes and at various ages, and they have correlated their values with the anthropometrical values obtained by Viola's method. The results are reported in Table V. Dividing the average body weight of the adult of twenty to thirty years by the cardiac surface, we have a quotient of about 0.70; in the child of five years this quotient is 0.43; in the boy of ten years, 0.54.

In estimating the relative development of the two sides of the heart we may, according to Brugsch, use as a criterion for the relative preponderance of the right heart the so-called mitral configuration of the heart. This is the brachymorphic, flask-like shape, with the right transverse semidiameter more developed than the left, the apex raised, the first part of the left border of the cardiac shadow displaced upward and the second arch on the left (pulmonary arch) relatively more protruding and pulsating than the first arch (with a relatively narrow aorta but a wide conus arteriosus and a wide pulmonary artery). To these may be added other criteria furnished by auscultation and by a functional examination (page 152), showing a cardiac hypoevolutism, an infantile type of heart, since in children and up to the time of puberty the right heart normally preponderates over the left. At puberty the right and the left heart become equal, while toward the age of forty years, and even more in old age, the left heart and the aorta preponderate over the right heart and the pulmonary artery. In this case the heart has an elongated form with lowered apex, the right semidistance of the orthodiagram being considerably reduced as compared with the left and, especially, with the heart's longitudinal diameter, while the aortic arch projects considerably more than the pulmonary arch.

TABLE V.—PROPORTIONAL SIZE OF THE HEART, ACCORDING TO A. ROSSI.

Trunk value, Viola's degrees.	Average heart surface, sq. cm.	Average angle of inclination.
−8 to −3	82.65	39.4
−3 to +1	86.10	37.7
+1 to +5	90.80	36.0
+5 to +11	91.40	35.7
Thoracic value, Viola's degrees.		
−8 to −3	82.80	37.5
−3 to +1	86.40	36.4
+1 to +5	88.70	36.5
+5 to +11	93.10	36.1

Rossi, in order to appreciate the preponderance of either the right or the left heart, measures the left chord of the heart's figure (between the apex and the auriculo-ventricular border) and the lower chord (between the apex and the hepato-cardiac angle), and then divides the latter by the former. The quotient in a normal adult heart varies from 1.18 to 1.30. A small quotient denotes preponderance of the left heart; a large one, preponderance of the right. In children of five years it is 1.43; in a boy of ten years, 1.33.

In addition to the development of the heart it is also interesting to determine that of the arterial system. De Giovanni had already observed that dolichomorphic hearts, or those of *mature type,* with preponderance of the left ventricle, have also a well-developed aorta and arterial system and a reduced lymphatic-venous system, while, conversely, hearts with a very large right portion, that is, those of *infantile type,* show a restriction of the arterial system and an excess of the lymphatic-venous system.

Von Brugsch has recently confirmed this by his investigations. This author determines the relation between the development of the arteries and that of the heart by using as an approximate criterion for comparison the measurement of the transverse diameter of the vascular bundle where it leaves the heart, which he procures by means of the cardiac teleroentgenograph. He compares this measurement with that of the total cardiac transverse diameter and gives the name of *cardio-vascular relation* to the quotient:

$$\frac{\text{Transverse diameter of the bundle}}{\text{Transverse diameter of the heart}}$$

In the adult male this is about $\frac{1}{1.75}$ and in the adult female about $\frac{1}{2}$ (smaller in the female because she has a relatively narrower aorta). If this index is less than $\frac{1}{2}$ we speak of *arterial hypoplasia,* unless the size of the heart is pathologically altered.

From the anatomical studies of Beneke, confirmed by the roentgenographic clinical observations of Brugsch, we find that the development of the heart and of the aorta do not run parallel. In fact the heart grows ten times its original size from birth to the completion of puberty, while the aorta grows only three times. So that in the infant and the child we find the arteries relatively very wide in comparison with the small size of the heart (Nobécourt); at puberty the heart grows rapidly and noticeably, while the aorta remains backward and is, in addition, stretched longitudinally on account of the rapid growth in length of the vertebral column during that period (F. Kraus). This results in a physiological *puberal aortic stenosis* which corrects itself later at the adult age during the long period in which the organism grows in width, with the aorta also progressively widening.

According to Brugsch an arterial hypoplasia is found to coëxist with an excessive development of the lymphatic system—a fact already established by De Giovanni.

From this we may conclude that there exist two antithetic types of cardiac development. On the one hand, we have the infantile, or right cardiac, or hypoevolute, or brachymorphic type, with preponderance of the right portion of the heart over the left and of the pulmonary artery over the aorta, with arterial hypoplasia and lymphatic-venous hyperplasia; and, on the other hand, we have a hyperadult, or left cardiac, or dolichomorphic type, with preponderance of the left portion of the heart over the right and of the aorta over the pulmonary artery, and with a well-developed arterial system and a reduced lymphatic-venous system.

All this, moreover, can be true independently of the total mass of the heart, which may even be constitutionally large and yet hypoevolute morphologically (De Giovanni).

In view of the great importance, for equilibrium and for normal circulatory sufficiency, of the proportionate and harmonious functioning of the right and left portions of the heart, of the hemodynamics of the pulmonary and of the systemic circulation, it can be readily understood that a heart in which the left segment is deficient as compared with the right will show a tendency to arterial hypotension and to stasis in the lymphatic-venous circulation and the pulmonary circulation. Conversely, a heart whose left portion functions to excess while its right portion is weak will show a tendency to arterial hypertension, to active arterial congestion and all the consequences proceeding from these conditions.

Now De Giovanni had shown that the type of heart whose right portion preponderates, that is, a morphologically hypoevolute heart, may be found either in subjects of dolichomorphic type (Viola's microsplanchnic) or in those of the opposite brachymorphic type (Viola's megalosplanchnic), but that in the first type the heart is oftener small (not always, however, according to the investigations of Brugsch and Gagliardi), while in the second type it is more likely to be large.

Here, therefore, is an example in which, as Brugsch has rightly and in the modern spirit insisted, the cardiac type is not in harmony with the subject's general anthropometric type. From this observation there arises the necessity of a separate study of the cardiovascular apparatus in order to define constitution, since it is impossible to deduce cardio-vascular behavior directly from the external morphological type of constitution.

Passing now to the consideration of the striped muscular system, we find that this can be evaluated by simple inspection and palpation (some authors use the measurements of the circumference of the lower end of the forearm). Even if we admit as a general principle that hypovegetative or microsplanchnic constitutions often have long, slender, hypotonic, insufficiently developed muscles, and that, conversely, the hypervegetative, or megalosplanchnic, constitutions often have thick, short, elastic, powerful muscles, it is still true that the muscular system also not infrequently presents *autochthonous characteristics* which are in disharmony with the general physical style. For this reason many authors have created, as we shall see later, a human constitutional type from the predominance of the development of the skeletal muscles (De Giovanni's second combination and Kretschmer's athletic type), although this type, as a general bodily style, quite frequently falls into one or the other of the two fundamental natural types individualized by Viola.

In fact it is certain that there exists a dolichomorphic and a brachymorphic type, and that the brachymorphic or megalosplanchnic type, although usually muscular, may in some cases have a mediocre or flaccid muscular system (corresponding to what Kretschmer recently styled the "pyknic type").

Now we have only to consider the importance of the skeletal musculature in the entire functional resultant of the organism, both on the somatic and on the psychic side, to see the necessity of fixing the status of this great system also independently of the anthropometric formula.

Again, in arriving at an estimate of the blood and the hemolymphopoietic organs, we often find here, too, noteworthy disharmonies in the relation of these to the general bodily habitus.

We must, above all, seek out the degree of morphological evolution of the blood in any given individual, finding first the relation between the erythrocytes and the leukocytes and then, in the latter, the relation between the lymphocyte and granulocyte series. It is known that hypoevolutism of the blood shows itself by a deficiency in the value of the hemoglobin index (chlorotic state), by the frequency of microcytes (Naegeli) and, especially, by lymphocytosis-neutropenia, that is, by the persistence of an excessive production of lymphocytes by the lymphocytogenous system, as compared with the functioning of the granulocytogenous tissue, which reaches its functional maturity later than the preceding system, as is seen by the relations between lymphocytes and leukocytes at the various ages.

The table below is taken from Brugsch:

At the age of.	Leukocytes, per cent.	Lymphocytes, per cent.
1 year	40	60
3 years	40	60
7 "	50	50
10 "	50	50
14 "	60	40
20 "	70	30
30 "	70	30
40 "	70–80	20
50 "	80	20
60 "	80–90	10–20
70 "	80–90	10–20

This chlorotic-lymphatic condition of the blood, which is accompanied by a hyperplasia of the lymphatic apparatus as a further expression of organic immaturity (the richness in lymph and in lymphogenous organs being, within certain limits, a characteristic of the infantile age, while these organs noticeably retrograde after puberty), may be met without any constant relation to the subject's morphological *habitus*. In fact this hematic hypoplasia and lymphatic hyperplasia are found both in microsplanchnic and in macrosplanchnic subjects; on the other hand, there are typical microsplanchnics having well-developed blood and rather undeveloped lymphatic organs, and typical megalosplanchnics in whom we do not find the characteristics of these constitutions—hypoevolutism of the blood and lymphatism—as a partial manifestation of the evolutional immaturity of the subjects (De Giovanni).

We have only to consider the importance of granulocytes in the struggle against infections, and of lymphomonocytes (Bergel), particularly in the struggle against Koch's bacilli, to understand the clinical importance of establishing in the individual the state of development of the two great systems, the granulocytogenous and the lymphocytogenous.

Coming finally to the sexual apparatus, we find that even though this be ordinarily normally evolute or hyperevolute in subjects morphologically hyperevolute, as are Viola's microsplanchnics, there are, nevertheless, certain cases of this type (those that we have designated as hyperthymic, hypoadrenal, eunuchoid and hyperpituitary) that show sexual hypoevolutism. On the other hand, constitutional sexual characteristics may be well developed in megalosplanchnic constitutions, but may also occasionally be deficient. This variable behavior of the sexual apparatus cannot but imprint upon the individual's soma as upon his psyche, through the humoral path, special dynamic characteristics which are independent of his general physical style.

From all the above we conclude that in the analysis of constitution the morphological criterion leads us to distinguish two natural *fundamental types,* according to the natural law of deformation of the ethnic type, determined by Viola—one that is morphologically hyperevolute and one morphologically hypoevolute. But it is necessary to distinguish in each type very frequent *impure varieties,* due to the combination of contrasting evolutional errors affecting organic systems of primary importance. For instance, in the microsplanchnic constitution we may encounter varieties characterized by hypoplasia of the cardio-vascular apparatus, of the blood, of the sexual apparatus, or of all three at once; or in the megalosplanchnic constitution we may meet with an impure variety due to the excessive development of the muscular, the circulatory or the sexual apparatus, or of the blood, or of all these together, or of several at once.

In the criterion of morphological analysis of constitution we include not only the estimation of the whole bodily mass, the relation between the trunk and limbs and the development of the four systems already mentioned, but also the general tonus of the bodily forms, that complex of characteristics of the human form which depends essentially on the tonus of the tissues, their resistance or flaccidity, with special reference to the muscular-ligamentous apparatus.

THE DYNAMIC-HUMORAL CRITERION (NEURO-CHEMICAL).

The second fundamental criterion which we must adopt in our constitutional analysis is that of the functional examination of each separate apparatus, but, most of all, that of the one great apparatus—the neuro-endocrine—which by unanimous consent of all our best modern constitutionalists serves to establish a vital neurochemical coördination, a neuro-chemical consensus, between all the parts and all that is most characteristic and personal in the constitution.

And since it is the humoral and, above all, the endocrine dominant that imprints a special *orientation* upon the functioning of the various separate apparatus, such as the circulatory, the digestive, the genito-urinary, the nervous, the muscular, etc. (for it is recognized today that the hormones possess general regulatory action over the genesis of all the humors), we can, even while taking account of the autochthonous functional properties of each, limit ourselves to an investigation of the special individual endocrine dominant or, as we may say, the special *individual endocrine formula*, in order to understand the type of *dynamic orientation* which the various organs and systems present in the individual. In this dynamic-humoral estimate of constitution, as in the morphological, we shall likewise certainly find it impossible to fix upon types in which all the parts come under the same laws of neuro-endocrine correlation. This is due chiefly to the crossing of hereditary influences and to the local hereditary (or even acquired) constitution of the individual parts, by virtue of which these depart more or less from the type of functional orientation which dominates the others. But the criterion of the endocrine dominant not only affords us the great advantage of explaining the dynamic type of pretty nearly all the parts that make up the individual organism, but also enables us to understand what has hitherto remained very enigmatic, namely, the relations between the subject's morphological type and his functional temperament, just as we shall see later on that this same dynamic-endocrine criterion will also enable us to explain certain intimate connections between the morphological and the psychical aspect of the personality.

Now my own investigations (dating from 1910) of Viola's two principal morphological constitutions, with regard to their endocrine formula—investigations in which I have made use of all the semiological criteria of modern endocrinology—have led me to establish the fact that Viola's *pure microsplanchnic type*, the morphologically-hyperevolute, presents on the part of its hormonic formula a functional predominance of the thyroid, or of the thyroid, hypophysis and adrenals all together. In the impure varieties, however, which, as we have already seen, also show morphologically important signs of hypoplasia of certain systems, the above endocrine formula appears more complicated, because of the combination of a constitutional insufficiency of certain other important glands, such as the suprarenal, the genital or the parathyroid, or because of the superimposing of hyperthymism upon hyperthyroidism. Hence, alongside of the classic *dolichomorphic hyperthyroid* or *hyperpituitary-hyperthyroid type*, four other types appear: A *dolichomorphic hyperthyroid-hyperthymic;* a *dolichomorphic hypoadrenal;* a *dolichomorphic* *hypogenital;* a *dolichomorphic hypoparathyroid* or *spasmophilic.* Nor need we limit ourselves to these, the more pronounced varieties of the type that are encountered in practice, for the individual endocrine combinations are naturally infinite in number (hypopituitary marks, for example, being very frequently encountered in the hypoadrenal and hypogenital microsplanchnic varieties).

On the other hand, in Viola's morphologically hypoevolute, brachymorphic or pure megalosplanchnic habitus we find as endocrine dominant a certain degree of hypofunctioning of the thyroid or of the thyroid and hypophysis together. But in the impure varieties of this habitus the fundamental endocrine dominant may be combined with or masked by another, which (considering the more frequent cases) may be hyperadrenalism or hypergenitalism, or both these at once; or it may be hyperpancreatism. So that we assume also in the brachymorphic type a pure hypothyroid or hypothyroid-hypopituitary type, and a hyperadrenal, a hypergenital and a hyperpancreatic variety.

Naturally in individuals in whom microsplanchny and megalosplanchny are combined the endocrine characteristics of the two types likewise appear more complex than those cited above.

Our own conclusions with regard to the endocrine formula or glandular constellation (J. Bauer) in the two antithetic morphological types of the human species are perfectly in accord with the recent findings of other authors (L. Lévi, R. Stern, J. Bauer, Naccarati, Angelucci, Castellino, etc.).

The endocrine formula found in each of the two fundamental morphological types confirms the endocrinological principle which I have developed since 1912, and enables us to complete Viola's law with regard to the determination of the individual bodily variations. This principle establishes a functional grouping of hormones for the morphogenesis of the body. In my opinion a hormonic group in which the thyroid, the hypophysis and certain genital and adrenal hormones take part stimulates the morphogenesis of the system of the life of relation and the morphological differentiation of the body. On the other hand, another great group, to which belong certain genital and adrenal hormones, the parathyroids, thymus and pineal gland, and perhaps the tonsils and the liver, stimulates the anabolic processes, the morphogenesis of the system of the vegetative life and the ponderal evolution of the body, while it moderates the morphogenesis of the animal system and the morphological evolution. If the two groups are evenly balanced in their functional potentialities and work eurhythmically during the period of growth, in which each must exercise its own function, the result is the eurhythmic normosplanchnic; if the hormonic group stimulating the vegetative morphogenesis is stronger we have the megalosplanchnic type; while if the group stimulating the animal morphogenesis predominates, we have the microsplanchnic type.

In our enumeration of constitutional endocrine types we have placed side by side and almost identified the hyperthyroid and hyperpituitary constitutions, since it is practically impossible to separate the pure hyperpituitary constitution from a hyperthyroid component, in view of the very close synergy in morbid states between the hypophysis and the thyroid in normal growth. But from the description of various constitutions we shall see the possibility of bringing out certain differential marks between the hyperthyroid and hyperthyroid-hyperpituitary dolichomorphic types and between the hypothyroid and hypothyroid-hypopituitary brachymorphic types.

Before concluding our description of the dynamic-humoral criterion of analysis of constitution, we must remember that one of the most essential data to be obtained for orienting ourselves to the biochemistry of the individual, and one which is, moreover, intimately related to endocrine balance, is the rate of the basal metabolism, which can be studied today by means of the simplified apparatus of Benedict.

Together with this basal metabolism we must establish the *specific dynamic action of food*, through the study of the gaseous exchange after administration of a given ration to the subject, for instance 200 gm. of meat, 50 to 100 gm. of fat and 500 cc. of coffee (Plaut). Whereas in the normal person having a regular nutrition the increase of metabolism by specific dynamic action reaches 30 per cent in undernourished subjects, it is much less and in over-nourished much more. Today certain authors (Plaut, Grafe) tend to explain constitutional thinness by an exaggerated specific dynamic action of the food consumed, and certain cases of obesity by a diminished specific dynamic action, even while the basal metabolism remains unaltered. According to Plaut, the thyroid electively stimulates the basal metabolism, and the hypophysis the dynamic action of the alimentation.

The study of glycemia and of carbohydrate tolerance, with the determining of the glycemic curve after the administration of a given quantity of glucose, is also of great importance as a dynamic-humoral constitutional criterion, since this tolerance is intimately related to the sympathetic-endocrine balance. And finally my latest researches show that it is very desirable to estimate the alkali reserve of the individual, and the blood level of calcium, potassium glucose and cholesterin. These studies can be easily carried out today through the various micromethods.

After establishing the chemical-hormonic dominants it is necessary for the understanding of the dynamic aptitude of the various organs, to estimate the nervous dominant, which is now known to be intimately connected with the chemical.

We must accordingly examine with the means that modern semiology puts at our disposal the *vegetative neurotonus* and the *animal neurotonus* of our subjects. As we know, Eppinger and Hess have of late years stressed the importance of the tonus of the vegetative nervous system in the judgment of constitution (constitutional vagotonia and sympathicotonia), while Tandler attributes importance to the tonus of the voluntary muscles (differentiating hypotonic, hypertonic and normotonic subjects).

In order to explore the tonus of the vegetative nervous system it is necessary first of all to have a thorough and exact *physiological anamnesis* and to make functional examinations of all the apparatus, for the purpose of ascertaining whether the influence of the parasympathetic or that of the sympathetic system preponderates in the function and functional tendencies, or whether these two great neuro-vegetative subdivisions are evenly balanced, or if they are in a state of unstable equilibrium in which now one and now the other is the stronger.

Thus, if we find in a subject a very ready acceleration of the heart from psychical causes, along with an habitual slight tachycardia, without any symptoms of myocardial insufficiency; if, in addition, there is a tendency to spasm of the arterioles and to hypertension after emotional influences, with a prompt appearance (from psychical causes, for instance) of phenomena of secretory and motor inhibition of the stomach and colon, of glycosuria, mydriasis or exophthalmos—all of which indicate a state of constitutional or acquired hyperexcitability of the sympathetic *sensu strictiori*—we are justified in suspecting the existence of sympathicotonia in our subject. Conversely, the definite tendency in an individual to salivary, nasal, lacrimal, gastric and intestinal hypersecretion, to hyperperistalsis, vomiting and localized spasms in the stomach and colon, the existence of a habitual bradycardia, respiratory arrhythmia, extrasystoles, hypotension, hyperchlorhydria or physiological gastro-succhorrhea, habitual spastic constipation, miosis, etc. all of which are phenomena referable to hyperexcitability of the parasympathetic system - will enable us to assume a state of parasympathicotonia. In addition to this anamnestic symptomatology we shall notice on the part of the psyche a serene, apathetic or depressed and bradypsychical character when the vagal system preponderates, and an uneasy, intolerant, irascible, aggressive, hyperactive character when the sympathetic dominates the picture.

This anamnestic-functional investigation will be completed by certain pharmacodynamic tests, to determine the subject's mode of reaction to the subcutaneous (or, better still, intravenous) injection of adrenalin (1 mg. for a subcutaneous, 0.1 mg. for an intravenous, injection) of pilocarpine hydrochloride (1 cg. subcutaneously), of neutral atropine sulphate (1 mg. subcutaneously) and of eserine hydrobromide (0.25 mg. subcutaneously).[1]

Adrenalin excites electively but not exclusively the sympathetic, and we may suspect sympathicotonia when, following injection, there is a pulse acceleration of one-third more than the usual, with an increase of 30 to 40 mm. of systolic pressure, a doubling of the amount of urine voided during the following twenty-four hours over that of the preceding twenty-four, the appearance of more than 5 gm. glucose, presence of hypertonia, noticeable pallor, a feeling of malaise and retrosternal constriction, or a state of anxiety and intense muscular tremors.

Pilocarpine stimulates the parasympathetic nerves. There is reason to suspect parasympathicotonia when, after the injection, intense salivation and copious perspiration appear, with vessel dilatation and marked reddening of the skin, diarrhea, vomiting, lacrimal hypersecretion, gastrosuccorrhea, an asthmatic sensation, miosis or rectal or vesical tenesmus.

Atropine acts in the same direction as adrenalin, but paralyzes, in different degrees, the ends of the parasympathetic nerves. If there is a marked acceleration of the pulse with rapid mydriasis, and a sense of dryness of the mouth, one may suspect hypovagotonia and relative sympathicotonia.

According to Mougeot, eserine has even a stronger exciting effect than pilocarpine upon the vagus. If bradycardia or intestinal hyperperistalsis is lacking we may suspect absolute or relative hypovagotonia.

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[1] In addition the intracutaneous injection of 0.1 cc. of a 1 to 1,000,000 solution of adrenalin may be used and the intensity of the resulting vasoconstrictor reaction noted. (See A. F. Hecht: Die Haut als Testobjekt, Vienna, Springer, 1925.)

Another stimulant of the parasympathetic recently found is histamine, which has an elective action upon the vasodilators. According to Schenk, the injection of 2 to 3 mg. produces intense vasodilatation and carries the blood-pressure down to 50 mm. Hg.

Insulin similarly stimulates the parasympathetic, so that we may assume as a good sign of parasympathicotonia, especially of the hepatic vagal district, a marked hypoglycemia following injection of small doses of insulin after administration of 50 to 100 gm. glucose per os. In vagotonic individuals the simple ingestion of 100 gm. sugar may also produce only slight hyperglycemia or even hypoglycemia, because of the coëxistence of hyperinsulinism.

A substance having an elective paralyzing action upon the sympathetic is ergotamin, a veritable antagonist of adrenalin.

The results of these pharmacodynamic tests upon the vegetative nervous system must be accepted with great reserve, for they may depend not only upon the condition of the dominant neuro-vegetative tonus of a given organ, but also upon the state of receptivity of the organs and terminal tissues upon which they act. This reactivity may be increased or diminished or inverted for reasons of ionic equilibrium,[1] which explain also why the reactions to such neurotropic substances often appear dissociated; for example, in the same individual adrenalin produces glycosuria and polyuria, but without marked tachycardia or hypertension. It explains too why the reactions may appear inverted; thus, adrenalin may produce arterial hypotension instead of hypertension, according to the reactivity of the smooth fibers of the vessel walls, and may cause vagal instead of sympathetic stimulation. In the same way atropine in small doses may excite instead of paralyzing the vagus.

Furthermore, sympathicotonic and parasympathicotonic reactions very often coëxist in the same subject, especially if they are partial and dissociated.

Finally, these substances give no information concerning the tonus of the centers of the vegetative nervous system but only concerning the ends of this system. For the centers we should have to experiment with other substances not yet used in practice, such as ergotamin, which paralyzes the centers of the sympathetic, and picrotoxin, which stimulates the centers of the parasympathetic (Meyer).

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[1] For instance, when there is excess of calcium, even a parasympathetic substance may act as a sympathetic one.

The following reflexes, however, may serve as tests for orientation upon the condition of the centers of the vegetative nervous system.

Oculo-cardiac reflex: Gradual compression of the eyeballs up to thirty seconds without pain, with the patient recumbent. If the reflex is positive there is a slowing down of over 12 beats a minute; if strongly positive the heart may even stop beating a few instants; if normal, there is a slowing down of only 4 to 12 beats; if absent there is no retardation; if inverted there will be an acceleration of the heart instead. The ocular compression stimulates the bulbar centers of the vagus, through the afferent pathway of the trigeminus according to some authors, but through the sympathetic according to Barré and Laignel Lavastine. The more excitable these centers are the easier is the inhibition of the heart, while if the accelerator centers are hyperexcitable the stimulus can discharge itself more easily upon these centers. Compression of the eyeballs may also produce other phenomena of parasympathetic excitation: auricular constriction of the right heart (Minerbi's oculo-myocardiac reflex); active dilatation of the ventricles and the large veins; increase of blood-pressure; retardation and deepening of the respiration; contractions of the stomach, bowels, bladder, etc.

Pilomotor reflex or Pende's trichographism: This must be sought not on the face and hands but on the thorax and limbs. It gives information as to the state of excitability of the special centers of the cutaneous sympathetic which supply the arrectores pilorum muscles of the corresponding zones of the skin. It consists in producing the phenomenon of goose-flesh through stroking the skin.

Erben's reflex: Slowing down of the pulse upon bending the head and trunk strongly forward. This is a symptom of vagal hyperexcitability.

Somagyi's reflex: Widening of the pupils on deep inspiration and contraction on expiration. It also accompanies respiratory arhythmia (acceleration at the acme of a deep inspiration, slowing on expiration) and denotes an instability, an irritable weakness, of the cardiac vagus.

Löwi's pupillary reflex: Mydriasis following conjunctival instillation of a few drops of a 1 to 1000 solution of adrenalin. It indicates hyperexcitability of the iridodilator sympathetic or of the muscular fibers of the dilator muscle of the iris. Conjunctival instillation of a 1 per cent pituitrin solution acts in the same way as adrenalin.

Red dermographia, accentuated and persistent, or appearing in large spots at a distance from the zone stimulated: This denotes hyperexcitability of the cutaneous vasodilators (sympathetic or parasympathetic?). It can be obtained most frequently on the thorax, more rarely on the abdomen.

White or chiefly white dermographia, persistent and extended: This shows hyperexcitability of the vasoconstrictors (sympathetic). It can be found most easily on the abdomen.

Elevated or urticarial dermographia: The production of wheal-like streaks and pomphi by mechanical stimulation. This signifies hyperexcitability of the skin (sympathetic or parasympathetic?).

Sergent's white line: Production of a more or less persistent ischemic line by making a light stroke from above downward upon the median line of the abdominal wall. This is found rather frequently in cases where the sympathetic tonus is seriously lowered.

Another useful reflex for the exploration of the sympathetic excitability is *Ruggeri's,* which consists in the varying degree of pulse acceleration that follows a strong convergence of the eyeballs toward something very close to the eyes.

In the study of the vegetative neurotonus and its relation to psychic character, great importance attaches to the inquiry into the sympathetic, that is, the internal sensitivity—all that array of subconscious afferent impulses which arrive at the brain from all the various organs of vegetative life and are synthesized in the general physical feeling of well-being or malaise; or they may appear in consciousness as impulses and instincts. These are internal feelings which make up the true roots of our affective life, and they naturally undergo alterations from causes that affect the excitability of the pathways and centers of the sympathetic, which form the basis of cenesthesia and visceral sensibility. The sympathetic is an excito-catabolic system, to which is delegated the mobilization of all the organic defenses in the struggle for life; during its stimulation, expecially if this is strong, sensations of pain reach the ego from the disturbed tissues through the afferent pathways of the sympathetic itself, with the necessity of reaction and defense. On the other hand, the stimulation of the parasympathetic, which is an excito-anabolic system, contributes to increase the sense of vitality, that is, it gives a sensation of increased *turgor vitalis* of the tissues. Neuralgias that follow sympathetic stimulation are often associated with irascibility, restlessness, fury and vasomotor excitation; those that follow parasympathetic stimulation, with exaggerated apprehension, anxiety, fear of death and immobility.

The existence also of phenomena of hyperthyroidism and hyperadrenalism in the subjects may supply information as to the state of hyperexcitability of the sympathetic, since the thyroid and suprarenal glands act as sensitizers of the sympathetic itself (in the male the testicle also acting in the same way); while opposite states of hypoadrenalism and hypothyroidism are accompanied by relative hyposympathicotonia and hypervagotonia.

An excellent criterion for the assumption of a vagal hyperexcitability is represented by the digestive hypoglycemic reaction, that is, the existence of low blood-sugar values (0.8 to 0.9 per cent) two to three hours after an abundant carbohydrate meal or after ingestion of 100 gm. sugar. Another good criterion is the phlorizin glycosuria reaction.

Recent studies have also introduced into the semiology of the vegetative system the adrenalin, caffeine and morphine *intracutaneous tests* which enable us to explore the three great fields of neurovegetative innervation—the vasoconstrictor, the vasodilator and the lymphosecretory.

Following intracutaneous injection of 0.1 cc. adrenalin, in dilution from 1 to 10,000,000 to 1 to 1,000,000,000, there is a vasoconstrictor reaction, the intensity or diffusion of which varies according to the excitability of the vasoconstrictors (reactions weak in Addison's disease and in diabetes; almost wanting in myxedema; strong in Basedow's disease—in which, however, it is possible to have also a paradoxical vasodilator reaction—and in nephritics with hypertension.

The intracutaneous injection of 0.1 cc. of a 0.5 to 1 per cent caffeine solution in physiological serum produces a vasodilator reaction, frequently with a hemorrhagic center, which appears in exaggerated degree in diabetes and Addison's disease, and in mild degree in myxedema.

The result of intracutaneous injection of 0.1 cc. of a 1 to 10,000,000 (normal reaction) or a 1 to 1,000,000 (weak reaction) morphine solution is a large red hive, due to vasosecretory and lymphagogue stimulation: The reaction is strong in Basedow's and Addison's diseases and in diabetes. There is generally a relationship between the morphine hive and urticaria factitia, which may probably be regarded as a sign of parasympathicotonia.

The disposition to hyperpigmentation of the skin following exposure to light or chemical irritation is another circumstantial proof of sympathetic hypotonia. Finally, the individual psychic character may also be useful for orientation, being quite different in sympatheticotonics and in vagotonics, as we shall see later.

The neuro-chemical dominant of constitution having been established, we can attempt to define the two fundamental qualities under which the function of any individual apparatus may be considered: on the one hand, the energy and the resistance of the function, and on the other, its velocity and precision. Thus we shall be able to distinguish whether the individual is normosthenic, hyposthenic or hypersthenic, and whether he is tachypragic or bradypragic, in his functional reactions.

Coming now to an investigation of the animal neurotonus, we find one of the most important studies to be that of the tonus of the skeletal muscles, which is determined by palpating their degree of consistency while in a state of rest. According to modern observations (E. Frank, De Boers, etc.), this muscular tonus seems to be subordinated to the parasympathetic nerve supply. Moreover, it appears that a deficiency in tonus is accompanied by an internal sensation of weakness and hence by a lack of impulse to action, while a strong tonus is accompanied by internal sensations of strength, and hence by a vigorous impulse to action. The first of these conditions occurs when the vagal, the second when the sympathetic, tonus is predominant in the constitution.

In addition, the degree of electric and mechanical excitability of the muscles and nerves, the hyperreflexia or hyporeflexia (tendinous, cutaneous, muscular, etc.) and the study of the hyperesthesia or hypoesthesia of the general and special sensory systems may also throw light upon the state of excitability of the voluntary nervous system.

THE PSYCHOLOGICAL CRITERION.

Finally, we must inquire into the degree of evolution attained by what we may term the *individual psychic constitution,* since cases of partial psychic hypoevolutism are frequent (a lack of development of the critical faculty, for example); we must investigate as to whether the sexual psychic differentiation has been normally completed, bearing in mind that there exists in woman a greater emotionality, a stronger influence of the unconscious and subconscious on thought and will, a more lively fantasy, a predilection for concrete concepts and an aversion for abstract thought (Havelock Ellis, Bucura); also that such characteristics may be encountered in man also, from true arrest in development of psychic virility, or, conversely, that masculine psychic characteristics may be met in woman.

We believe that great importance attaches to the investigation of the degree of development of each of the two great segments of the psyche, the instinctive-affective and the intellective-volitive. The first of these, as is well known, represents the primitive psychic stratum, which preponderates in the child; the second represents the neopsychic stratum, which appears later in the phylogenetic as well as in the ontogenetic evolution. After puberty the neopsychic segment begins to consolidate itself, so to speak, very closely with the affective segment, since puberty is the period most predisposed to psychic or schizophrenic dissociations, which even the laity may observe under the form of the so-called incoherences of character, extravagances, variability of temperament and the like.

The study of the two great groups of *psychic temperaments* or *characters*, among which we include the minor characters, *the schizoid or schizothymic temperament* and *the cycloid or cyclothymic* (Kretschmer), has only recently been initiated, but it already abounds in interesting results. The first of these two has for its foundation the dissociation of the affective from the intellective life; the second, the oscillation of moods, of affects, up and down between the two extremes of euphoria and depression. To this we may add a third group not as yet well defined, that of epileptic and epileptoid or spasmophilic temperaments. It is precisely the relations of these three temperaments with the physical morphological type (Kretschmer) and with the endocrine-vegetative state (Pende, Goldstein, Buscaino) that afford material for modern investigations.

And today we see better and better demonstrated the concept that endogenous psychoses, of which the two fundamental types are manic-depressive psychosis and dementia praecox, are nothing more than nodal and culminating points, as Kretschmer says, in the midst of a dense tangle of somatic-psychic constitutional relations which can be traced successfully in all their scattered lines and manifold manifestations by studying those families in which the psychic atmosphere is, so to speak, one of predominantly schizothymic type, and those in which it tends rather to the cycloid or circular type.

The individuals found in the field of the manic-depressive constitution are described by Kretschmer as predominantly sociable, good-hearted, easy-going individuals, who can take a joke readily, who take life as it comes, are naturally generous and open, make friends easily and are frequently sympathetic and warm in their temperaments. Even those among them in whom inhibitions and depression prevail often make exactly this complaint, that they do not feel warmth or cordiality for men and things, which is a sign that for them this sense is an essential element of life; notwithstanding these inhibitory sensations they always behave affably and sociably in comparison with a schizothymic.

Cycloid individuals are always of frank, open nature, revealing their characters directly and naturally. Schizoids, on the contrary, have one nature on the surface and another lying deep. The surface nature is now rough, now surly, now somber, ironical, reserved, or secretive; or there may be no recognizable mask, but the individual appears to be an enigma, a question-mark. Beneath this outer sheath we may find nothingness, vacancy, affective dulness, coldness or emptiness of soul.

Their characteristic is *to live within themselves*—"*autismus*," as Bleuler calls it. It is hard to know what they feel; sometimes they may not even know it themselves. It is especially during the years of puberty that the characteristics of the schizoid are best manifested. The normal affects of puberty, its timidity, sentimentality and silly, pathetic exaggerations, bear a close relationship to certain sides of the schizoid temperament. These schizoid characteristics, according to Kretschmer, fall into three groups, being met with in subjects who are:

1. Unsociable, quiet, reserved, devoid of humor and eccentric.
2. Timid, shrinking, touchy, sensitive, nervous, excitable, lovers of nature and of books.
3. Docile, good-natured, honest, phlegmatic, stupid and dull.

As the cycloid temperament lies between the poles of gaiety and sadness, so does the schizoid lie between those of irritability and dulness. The *proportion of contrary moods* in cycloids changes by high and low tidal waves, while the *psycho-esthetic proportion* (the ratio of hyperesthetic and anesthetic elements) of the schizoids changes by fits and starts. The autismus of the schizoids is sometimes a symptom of psychic hypersensitivity, by virtue of which all the colors and tones of actual life have a repercussion, an exaggerated resonance, in the subject, who rolls up like a snail in its shell and avoids as much as possible all contact with his environment. In the anesthetic schizoids, on the other hand, the autismus consists in a lack of effective resonance from the environment, which causes the subject to live within himself because he takes no interest in what lies outside of him. In the majority of cases, however, there is a mingling of the two temperamental conditions, hostility toward the environment and indifference to it.

In Kretschmer's schizoid temperament many so-called nervous or hysterical or unbalanced characters are included, as well as those psychic constitutional syndromes termed by others *manifestations of catatonic reaction* and of *constitutional paranoia*.

The cyclothymics include the ordinary types of the practical man of action and the cheerful enjoyer of life. Among the more gifted members of the class we find the types of the broad, expansive realist and the good-natured humorist; from the artistic point of view, the type of empiric who goes on talking to convince, the cheap popularizer of science; in practical life, the conciliating and well-disposed middleman, the easy, energetic organizer and the tough, strong-minded whole-hogger.

Among schizothymics, on the other hand, we find numerous defective types, sulky eccentrics, egoists, vagrants and criminals; in the higher classes, types of fanatics, unsociable world-hostile idealists, aristocrats, who are simultaneously tender and cold. In the fields of art and poetry we find them as stylistically pure, formal artists and classicists, as romanticists and sentimental idyllics, as tragic pathetics and so on to the extremes of expressionism and tendentious naturalism; finally, we have the witty ironists and satirists. In ideas these subjects tend to scholastic formalism, to mystical metaphysics and rigorous schematization. In short, schizothymics are the gentleman natures (the *grands seigneurs*), the immovable heroic moralists, the pure idealists, the fanatics and despots and the cold calculators.

Leaving aside the epileptic character—which, as has been said, is not well individualized as a true psychic temperament, since it may be regarded more as a form of reaction of the nerve centers, analogous to spasmophilia—if we accept this distinction of Kretschmer's of two great natural groups of psychic characters (with infinite degrees of variation), it is not difficult to recognize that these two types of orientation correspond, along essential lines, to the two great types of psychic personality. One is that in which the development of the heart preponderates, and which, therefore, easily overflows and expands outward as an echo of all the joys and sorrows of the life of reality; the other is the type in which the brain or the fantasy, the ideas, or cold logic preponderates, either inhibiting or changing the direction of the currents of sentiment, or drying up the sources of affection.

Hence in this field also, as soon as we analyze the orientation of the psychic constitution we meet, as in our analysis of the morphological constitution, a developmental antagonism and an antithetic behavior on the part of the two great segments of the soul, the instinctive-affective and the intellective-volitive, just as we do on that of the two great segments of the body, the vegetative and the animal.

But what is more interesting, and what we derive from Kretschmer's studies, is the fact that we can also perceive a certain parallelism between the megalosplanchnic somatic type and the cyclothymic (hyperaffective) temperament, on the one hand, and between the microsplanchnic somatic type and the schizothymic (hypoaffective, hypercortical) temperament, on the other. In fact, Kretschmer finds that the majority of schizothymics have the asthenic-athletic constitution (corresponding to our microsplanchnic), and the majority of cyclothymics the constitution which he calls pyknic (corresponding to our megalosplanchnic). Ravà also recently found a predominance of the megalosplanchnic constitution in circular psychosis.

Now if we consider that the affective life, according to modern investigations, is intimately bound up with the functions of the organs of the vegetative life and with those of their regulating neuro-endocrine apparatus, situated in the mid-brain and in the large ganglia of the base, we are able to understand the connection between the hypervegetative constitution and that form of temperament in which euphoria and depression are strongly developed, as are also the internal feelings of *turgor vitalis* and of malaise, of vital *deficit* (see page 73). On the other hand, we also understand why there should be a preponderance of the intellective life linked to a poverty of the affective life in those individuals in whom there is somatic hyperevolution (microsplanchnics), an exaggerated development of the system of the life of relation, to which the sensorimotor apparatus, including the skeletal muscles, belongs.

Hence somatic and psychic hyperevolution would often (though not always) seem to go hand-in-hand, at least in so far as the correlations between the intellective and the affective parts of the mind are concerned, the latter relatively preponderating during the first period of life, the former during the adult and mature stage.

Naccarati's[1] recent investigations also lead us to assume a predominance of intelligent individuals in the microsplanchnic type, and of less intelligent ones in the megalosplanchnic type. But from our own extended studies it would seem that, although temperament (which puts a special dress upon the intelligence also) appears to be closely related to the somatic-humoral substratum of personality, nevertheless, when we come not to the type of intelligence, the *forma mentis*, but to its degree, its level of development, it is extremely difficult as yet to recognize a subordination to those same laws which govern the determination of morphological constitution and that of the individual psychic temperament.

Now we must remember that we have been able to distinguish, on the neuro-humoral side, certain leading morphologic-endocrine varieties in the megalosplanchnic, and certain others in the microsplanchnic, type. My own researches into the neuro-psychological orientation of these varieties have shown me that on the part both of the tonus of the vegetative nervous system and also of the psychic constitution there are to be found, corresponding to the three principal varieties of each fundamental human type, an equal number of neuro-psychological combinations, and (what is more important) that these combinations appear to be strictly coördinated with the respective neuro-hormonic formulæ which we have established for each of the above varieties.

Thus, in the pure hyperthyroid, or in the blended hyperthyroid and hyperpituitary variety, which corresponds to a certain number of microsplanchnics (those morphologically hyperevolute and rather harmonious), I have encountered a high but somewhat unstable vegetative neurotonus, in both a sympathetic and a parasympathetic direction and also an unstable animal neurotonus, hyperemotivity, very rapid nervous and mental reactions, an active volitive nature but one easily fatigued, with lively hypercritical intelligence and often brilliancy. In the hypoadrenal dolichomorphic variety there is a low animal and vegetative neurotonus with vagal preponderance; an asthenic, depressed, abulic character, with an intelligence which is in some cases hypoevolute and in others hyperevolute. In the hypogenital dolichomorphic variety we find a low animal neurotonus, a vegetative neurotonus generally elevated in a vagotonic direction, a phlegmatic or depressed character, a mind either of childish or of hetero-sexual type and hypoevolute intelligence. In the dolichomorphic hypothyroid or spasmophilic variety there exists also a hyperexcitability and hyperreflexism of the whole animal and vegetative nervous system, with pure schizoid temperament.

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[1] Since the appearance of the first Italian edition of this book we have extended our psychological researches on morphological types. In collaboration with Garrett, of Columbia University, we found that in speed and flexibility of mental and motor performance, as measured by cancellation, controlled association and maze-tracing, those individuals with high morphological indices (dolichomorphic) surpass those with low indices (brachymorphic); also that temperamental disturbances of an emotional nature are found in individuals with low morphological index more often than in those with high. As for intelligence, further investigations have convinced us that a great part of the correlation found between morphological index and intelligence quotient, as revealed by divers intelligence tests, indicates affinity between morphological types and form of intelligence, but quantitative intelligence, as expressed by capacity for learning, cannot be excluded altogether. Experiments by Guinzburg, Mira and Sheldon have confirmed our findings.—S. N.

Coming to the brachymorphic varieties, we find in the hypothyroid or hypothyroid-hypopituitary variety a torpid animal neurotonus, a depressed sympathetic but an elevated parasympathetic neurotonus, an apathetic, slow character, hypoevolute intelligence, marked especially by a lack of critical faculty, with predominance of concrete over logical thought. In the hyperadrenal or hyperadrenal-hyperpituitary brachymorphic variety we find an elevated animal neurotonus, a sympathetic and parasympathetic neurotonus also high, an active, violent character and a robust, often hyperevolute intelligence; and finally, in the hypergenital brachymorphic variety we find a high animal and vegetative neurotonus, an expansive, euphoric character, a lively imagination and mediocre intelligence of realistic type.

It is easy to note how our observations are also in accord with those of the authors already quoted on the predominance of cyclothymic characteristics in megalosplanchnic or hypervegetative subjects; the distinction brought out by us between these varieties will perhaps enable us to understand, in the future, the reason for the predominance of psychic excitement in some megalosplanchnics and of depression in others. It will also explain why some of these are hypovagotonic and others hypervagotonic. It will enable us also to understand why some authors, such as Max Löwy and F. Kisch, find hypovagotonia and sympathicotonia in the plethoric pyknic and cycloid, the ruddy and fat habitus, which should correspond to our brachymorphic, hyperadrenal and hypergenital variety, the real apoplectic habitus of the ancients, which is predominantly sympathicotonic.

In our microsplanchnics the marks of Kretschmer's schizoid temperament (which this author often finds attached to the asthenic constitution corresponding to my hyperthyroid-hypoadrenal types and to my dolichomorphic and hypoparathyroid habitus) are quite frequent, especially in the hyperthyroid-hypoadrenal and in the hyperthyroid-hypogenital varieties. But even in the hyperthyroid-hyperpituitary dolichomorphic type, which on account of the muscular development in a microsplanchnic habitus approaches the type of Kretschmer's athletic constitution (page 62), we may find characteristics of the schizothymic temperament agreeing with what this author found in such a habitus.

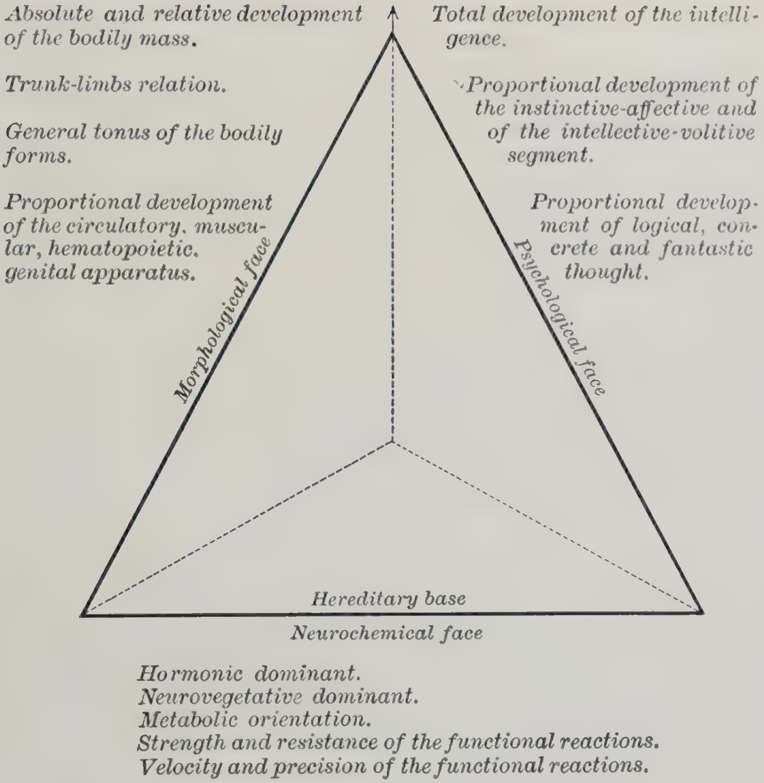
However, the type which Kretschmer calls *dysplastic* is even more frequent among the group of schizoid temperaments than is his athletic constitution. This dysplastic type is clearly dysendocrine and its form is distinctly that of eunuchoid gigantism, of eunuchoid and pluriglandular obesity, of infantilism and of the hypoplastic states. This chimes in perfectly with my investigations referred to above, as to the frequency of schizothymic marks in dolichomorphic subjects with hypoadrenal or hypogenital dominant characteristics (in whom morphological stigmata of general hypoplasia or of sexual hypoevolutism abound).

But it is the study of the relationships existing between vegetative nervous orientation and psychic character that at present throws the most light on the correlation between soma and psyche. We are enabled to state that according to the degree of the vagotonia, we may have in one case a euphoric, pacific and phlegmatic character if it corresponds to an orthovagotonia, that is, to a harmonic hyperfunction of the parasympathetic system that still permits a sufficient contribution of the sympathetic system, while in another case we may have a depressed and hypochondriac character, with anxieties, apprehensions and unmotivated psychialgical states, if the vagotonia is morbid and unbalanced, and is followed by a consensual hypotonia of the sympathetic section. Hypersympathicotonic subjects, on the contrary, show themselves restless, hyperactive, aggressive, rough and impulsive in their acts; they are easily annoyed and discontented with everything; they are excitable and enthusiastic, and appear extremely susceptible, with an exaggerated instinct of offense and defense. The vagotonics also demonstrate a great facility in unchaining those somatic reflexes that express pain (ready tears, cold sweats and fainting); in the sympathicotonics, on the other hand, there is a great power of resistance in masking physical and moral pain, but much facility in somatic manifestations of anger and offense emotions.

We might say that vagotonics have a tendency to asthenic emotions (pain and fear), while sympathicotonics tend to have sthenic emotions (anger and courage).

We will bring this chapter to a close with the assertion that the unitary semiological study of constitution enables us today to establish in a considerable number of cases, if not in all, bridges uniting its morphological, humoral and neuro-psychological faces, even though these three faces may show a considerable degree of autonomy, which we ought never to forget. But despite the tendency of the individual to deviate from the great general principles which regulate somatic-psychic ontogenetic evolution, the application of such principles to clinical medicine is the only means of orientation in the difficult problem of the understanding of individuality.

We publish here our diagram for the analysis of the individual biotype according to the fundamental criterion explained above.


Absolute and relative development of the bodily mass.
Trunk-limbs relation.
General tonus of the bodily forms.
Proportional development of the circulatory, muscular, hematopoietic, genital apparatus.
Total development of the intelligence.
Proportional development of the instinctive-affective and of the intellective-volitive segment.
Proportional development of logical, concrete and fantastic thought.
Morphological face
Psychological face
Hereditary base
Neurochemical face
Hormonic dominant.
Neurovegetative dominant.
Metabolic orientation.
Strength and resistance of the functional reactions.
Velocity and precision of the functional reactions.

CHAPTER IV.

THE PRINCIPAL ECTYPES OF THE GENERAL CONSTITUTION.

Earlier classifications—The French and German schools—The megalosplanchnic hypervegetative constitution—Synonyms—Description—Endocrine varieties and subgroups—Relation to bradytrophism—Morphological hypoevolution, its fundamental determining principle—Lymphatism—Exudative diathesis—Arthritism—Constitutional vagotonia—Carcinomatous tendency—The microsplanchnic hypovegetative constitution—Synonyms—Description of pure type and endocrine variants—Predisposition to pulmonary tuberculosis—Sympathicotonia and vagotonia—Tendency to erethism and tachypragia—Pathological dispositions—Degenerative states—Endocrine anomalies—Infantilism—Dwarfism—Gigantism.

In the preceding chapter we traced the lines of orientation for a primary distinction of the general constitutional ectypes, a distinction which, according to our school, must be founded upon the existence, in Nature and in every human race, of two completely antithetic types.[1] These, in their extreme variants, that is, in those individuals whose type is more pure and pronounced, show so perfect an antithesis of all bodily proportions, and, within the territory of the same type, such an exact correlation of all the measurements that Viola's ontogenetic law enables us to obtain, that it is impossible to deny to this division of Viola's into three types—normal, microsplanchnic or dolichomorphic, and megalosplanchnic or brachymorphic—the status of a true, natural, rational and scientific classification of morphological types.

For that matter the ancients had already intuitively recognized these two antithetic human types in their phthisic and apoplectic constitutions, and Beneke, as far back as 1881, had demonstrated by pathologico-anatomical researches the real existence of two such fundamental types. De Giovanni names three *morphological combinations*, as he expresses it, of which the first and third correspond to the microsplanchnic and the megalosplanchnic. He added an intermediate combination, which deviates from the normal type (whose regular proportions it has) only in the excess of the total bodily mass (Viola) and in the muscular strength, which, if exaggerated, causes this combination to resemble the athletic type of the ancients.

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[1] This does not interfere with the fact that in certain races one of the two morphological types predominates. Thus, Stratz distinguishes the white races, in which trunk and limbs are proportionate; the black races, in which there is an excess of the limbs over the trunk, and the yellow races, in which the trunk exceeds the limbs. But this is true of the average type found within the race, while the two kinds of deviation from the average type, the dolichomorphic and the brachymorphic, exist in all races. According to Wenckebach, the asthenic constitution is very frequent, almost normal, among the Frieslanders of Holland, while in Alsace the apoplectic constitution predominates.

De Giovanni's three combinations have recently been individualized anew by Kretschmer as the asthenic, athletic and pyknic types. We shall see that the real athletic is not a pure type, but may be built upon the fundamental proportions of the normal, of the brachymorphic or of the dolichomorphic, type by the addition of a conspicuous development of the muscular mass. Kretschmer also adds a fourth dysplastic type which is, in my opinion, a microsplanchnic variety with hypogenital predominance.

Sigaud, of Lyons, has made a somewhat impressionistic classification into four principal types, two of which correspond to the dolichomorphic and brachymorphic constitutions, which this author terms the respiratory and the digestive type, respectively, while the *muscular type* corresponds to the athletic type of other authors (De Giovanni's second combination with abnormal muscular development). There remains a fourth type, the *cerebral*, which is also, in my opinion, an impure type and hence a variety of our microsplanchnic, with a hypoevolutism of the general mass, short limbs and a large head.

Recently MacAuliffe, a valiant pupil and successor of Sigaud and a well-known specialist in human individual morphology, has modified in France his teacher's former classification, distinguishing four pure, or frank, or eugenetic, human types that should be types of normal beauty, although each one of them possesses a quality which can be seized more easily by artistic inspection than by means of bodily measurement. In the first, there is a remarkable relief of the muscular masses, which are not, however, excessively large (frank muscular type); the second is characterized by a conspicuous breadth and length of the thorax, which has the form of a trapezoid with the base at the top, and has a narrow breast approaching the pelvis (frank respiratory type); the third type has a moderate predominance of the abdomen, not so great as to deform the harmonic outline of the body (frank digestive type); the fourth has a moderate predominance of the skull (frank cerebral type).

These four human types should be considered, according to MacAuliffe, the four normal germs from which there may later originate (because of the type's deformation toward a true and proper constitutional inadequacy) the real athletic type, or the flat and long respiratory type, corresponding to the phthisic and asthenic habitus of the other authors; or the abdominal type, round, thick and pyknic, as Kretschmer calls it; or, finally, the disharmonic cerebral type, with large head and hypoplastic body.

From the standpoint of the bodily proportions, the frank muscular type and the cerebral type, especially the former, approach the average statistical type; in the first type, however, the upper and lower extremities are rather long in proportion to the trunk, and in the second the body is slightly small in proportion to the size of the skull. In the muscular type the face is rectangular and its three planes—the frontal, the oculo-naso-malar, and the bucco-mental—are of the same height and width as the middle nasal plane; in the digestive type, on the contrary, the mandibular plane of the face is the largest, while the reverse occurs in the cerebral type, where the mandible is rather small and the forehead and skull are broad.

It is quite easy to understand, by following MacAuliffe's own description and looking on the valiant Parisian morphologist's pictures, that there is no substantial difference between his four frank and his four irregular types, but just a difference of degree, and that the frank muscular type corresponds, as even he admits, to the adult normotype well developed in the system of the life of relation. On the one and the other side, respectively, of this system we can place all the degrees of those two types that are hyperevolute in the system of relation, either as regards muscular or cerebral mass (irregular muscular and irregular cerebral type), and all the degrees of those other two types that are hyperevolute in the system of the vegetative life (irregular thoracic and irregular abdominal type). Now since the former have a tendency to the flat and narrow shape, and the latter to the broad and round one, it is possible to reduce the types of the French morphological school to the two fundamental types of the Italian constitutional school, namely, the hypovegetative, or dolichomorphic type, in which the system of the life of relation predominates, and the hypervegetative, or brachymorphic type, in which the system of the nutritive life predominates.

Hence, MacAuliffe properly sets himself against the error committed by some authors, such as J. Bauer, Bounak and others, in identifying the respiratory or thoracic type of the French school with the phthisic or dolichomorphic habitus of the Italian morphologists and the asthenic habitus of the Germans. This confusion has arisen from the fact that the definition of Sigaud's thoracic type, modified at present by the addition of the quality of flatness or of roundness by MacAuliffe, leaves it uncertain whether these authors mean the large, but flat, thorax, contracted in an antero-posterior direction, as we find it in many subjects who are tuberculous or predisposed to tuberculosis; or whether they mean the large and square thorax, characteristic of many hypervegetative and arthritic individuals. In either case, according to the MacAuliffe terminology, one may speak of a respiratory type, but it is evident that the respiratory potentiality is great in the latter and deficient in the former—that is, in the long, flat and paralytic thorax—even though it is apparently prominent here because of the breadth of the shoulders.

I believe that MacAuliffe's classification would gain in clearness and clinical applicability if it would give greater importance to the sthenic or tonic, and to the asthenic or atonic, character of each type than to the particulars of the external form of the four types (flat, round, undulated, bossed). It is, indeed, undeniable that there may exist both a sthenic and tonic and an asthenic and flaccid type of the thoracic, the digestive, the cerebral and the muscular individual, and that these may exist in either dolichomorphics or brachymorphics. According to the results of my researches, this is due to the existence of different dynamic-humoral varieties in both the brachymorphic and the dolichomorphic types, among which we can recognize one pure type and several impure subtypes. The pure dolichomorphic hypersthenic type has an orthohyperthyroid or a hyperthyroid-hyperpituitary-hyperadrenal temperament; the pure brachymorphic hyposthenic has, on the contrary, a hypothyroid or hypothyroid-hypopituitary temperament.

The pure dolichomorphic hypersthenic, who is thus a supernormal subject because of the evolution of the bodily forms and because of his functional robustness, so long as his endocrine dominant remains within the limits of the physiological temperament, becomes hyposthenic and hypotonic when he takes on characters of hypo-adrenalism, hypogenitalism, hyperthymism or hypoparathyroidism. In the same way a pure hyposthenic brachymorphic appears strong and hypertonic when his character is mixed with hyperadrenalism or hypergenitalism.

More recently Brugsch, relying upon the ratio of the width of the thorax to the stature and upon the proportional weight, has arrived at the same differentiation into our two fundamental types, a slender and a broad. The Germans, since the appearance of Stiler's work, speak of an *asthenic constitution*, as of one sufficiently well defined morphologically, which Stiler himself has contrasted with the apoplectic habitus of the ancients, and which nearly all authors identify with the phthisic habitus of these, with the first morphological combination of Beneke and De Giovanni, and with our own microsplanchnic (J. Bauer). But however many points of contact there may be between our microsplanchnic and Stiler's asthenic type, I still maintain, as I have elsewhere set forth, that there can be no question of identity here, and that Stiler's asthenic is an impure microsplanchnic type, in which asthenia and atonia of the muscles and ligaments dominate, besides numerous stigmata of local morphological hypoevolution, while Viola's pure natural microsplanchnic type is a constitution which, as he has well demonstrated, is morphologically hyperevolute, and which, in the slight degrees of deviation from the average type, may be perfectly sthenic and resistant with even well-developed muscles, as can be observed in many athletes of dolichomorphic type.

This is why the German authors find at times in the asthenic constitution an excessive stature and macroskelia, that is, excessively long lower extremities, and again (more frequently, according to Stiler) extremities proportional to the trunk (contrary to our pure microsplanchnic constitution); at still other times characteristics of morphological hyperevolutism, in the thorax, for instance (Stiler); or again, hypoplastic and infantile characteristics (Hart, Freund, Mathes, Bezançon, Bartel, Eppinger and Hess).

We shall hold, therefore, to the description of the morphological and physio-pathological characteristics of Viola's two ectypes, but shall give the importance they deserve to the impure varieties and to the mixed or hybrid forms of these two ectypes, among which we shall identify certain constitutions distinguished by other authors.

MEGALOSPLANCHNIC HYPERVEGETATIVE CONSTITUTION.

Synonyms.—Apoplectic constitution (brevilineal), brachymorphic, square or arthritic constitution; the third combination of De Giovanni; the pyknic habitus of Kretschmer; the irregular digestive type of MacAuliffe, the lateral type of Stockard; the euryplastic type of Bounak.

The stature is medium or below medium, with an excess of bodily mass both in an absolute sense and relatively to the stature; there is a more or less abundant adipose covering; the body is of a round thick shape, due to a predominance of the horizontal diameters, especially the antero-posterior, over the vertical. The upper and lower extremities are short in proportion to the trunk, but the upper are relatively longer than the lower. The feet, however, are relatively longer than in the normal, and have a tendency to flatfoot. The hands are broad and short.

The total development of the trunk exceeds that of the extremities. The head is relatively large with a tendency to brachycephaly. Premature baldness is frequent, and the hair grows high on the temples and forehead. The face is broad and round, with a high sloping forehead, features little differentiated and sometimes puerile, rather small shifting eyes with but little expression, at times partly hidden by somewhat swollen lids, supra-orbital arches lacking prominence, general form of eye rather round, eyebrows often delicate, not very thick, lacking in the external third, conjunctivæ frequently reddened at the margin, with signs of chronic blepharitis. The nose is rather short and broad, the lips thick, the mouth rather large. The malar bones are inconspicuous, and the mandibular angles are developed outward in such a way that their vertical projection passes through the temple. There is a rather broad, round chin, its undersurface retreating gradually backward without folds to the angle of the jaw, and usually prominent forward so as to be in line with the forehead.

The shape of the face is often pentagonal. The mustache and beard in males frequently show a luxuriant, though coarse, growth, in contrast with the lack of hair on the head and eyebrows. (We shall find the contrary true of the microsplanchnic constitution.) Sometimes, however, there is little development of the mustache and beard. The larynx is little evident; the neck is large and appears as if wedged in between the shoulders on account of the slightness of the inclination of the upper thoracic opening and the relative elevation of the jugular notch. There are often deposits of fat on the back of the neck, corresponding to the prominent vertebra, under the angles of the jaw, under the chin, and in the supraclavicular fossæ (pseudo-lipomata).

In the trunk the preponderance of the size of the abdomen over that of the thorax is conspicuous, and the upper abdomen is relatively larger than the lower. The transverse section of the trunk at any level is more circular, less elliptical, than the normal, owing to the greater length of the antero-posterior diameters. The umbilicus is situated low. The thorax is rather short and large, with the antero-posterior diameter greatly exceeding the transverse; the hypochondria are enlarged, lacking the normal waist-line. There is a wide epigastric angle; the lateral walls of the thorax are broad. the ribs slightly inclined downward, the intercostal spaces somewhat narrow (thorax square, as if continuously expanded by inspiration). The jugular notch is very high, the shoulder line horizontal, the upper thoracic opening (ring of the first rib) bent forward slightly. In the rear the vertebral grooves are not much hollowed, and the costo-vertebral angles are very wide.

The antero-posterior diameter of the thorax is deficient as compared with that of the hypochondrium, because the typical inward turning of the lower portion of the sternum is also deficient, the latter being short, with an oblique direction downward and forward. The thoracic and the abdominal circumference are excessive both absolutely and relatively in comparison with the average. The pelvis, on the other hand, is relatively little developed in size. The diaphragmatic vault is high but flat, and the heart is found in a very oblique, almost horizontal position. The costo-diaphragmatic angle is relatively wide, and Luschka's incisure little pronounced. The skeletal muscles are short and thick, but are often covered with fat, so that they protrude very little under the skin with their bellies. The skeletal frame is solid and thick. The skin is tough, often oily on account of sebaceous hypersecretion, with the hair follicles plainly visible, often inflamed, especially on the nose. The skin is rich in blood capillaries, and for this reason frequently highly colored, especially on the face, where the tendency to acne rosacea is often met. But there are also pale, lymphatic brachymorphic types, with a thin skin through which an abundant venous reticulum can be seen. The hairs of the genitals and axillæ, and sometimes also those on the trunk and limbs, are well developed, but often scanty.

With regard to the internal organs, from the similar observations of Beneke and De Giovanni, confirmed by the investigations of our own school and those of Brugsch, we find in megalosplanchnic individuals short lungs, relatively small in proportion to the heart; the heart mass either well proportioned or excessive, with its right portion preponderant over its left, and the venous tree preponderant over the arterial. In a certain number of individuals of lean type, without tendency to obesity, we may instead find the left portion of the heart preponderant over the right, the aorta in excess of the pulmonary artery, and the arterial tree in excess of the venous (De Giovanni). The stomach is of short, horizontal type, generally of large size, and the intestine is relatively long and large. The liver and spleen are large. The genital organs and sexual characteristics are for the most part normally developed. Very often fecundity as well as the sexual instinct is rather exaggerated, but in certain cases the external genitals are small, the penis appears as though buried in a small cushion of fat; the secondary sexual characteristics are poorly pronounced.

According to De Giovanni (and recently confirmed by Wiesel), the megalosplanchnic constitution is marked by congenital hyperplasia of the lymphoid organs. There are, however, megalosplanchnics in whom this lymphatism is not at all demonstrable, and in whom there exists a true blood plethora instead of a lymphatic plethora (page 94).

The blood in megalosplanchnics may show a certain degree of polycythemia and hyperchromemia, as has already been observed by Senator. But in certain cases there is even found a slight diminution in the number of red cells, with chlorotic characteristics (Naegeli has recently pointed out the existence of chlorosis in stout women).

It is not so much by methodical investigations made upon healthy megalosplanchnics as by a study of pathological cases that we can infer, from their characteristic disposition to uricemic and diabetic symptoms, that the blood of these subjects must show a tendency to the accumulation of uric acid and glucose. The same can be said of cholesterin. It is presumable that K predominates over Ca, with a concomitant tendency to alkalosis and to retention of chlorides in the tissues.

My studies of the endocrine-sympathetic system in brachymorphic types have enabled me to distinguish, as I have already mentioned elsewhere, a *hypothyroid variety* in which the vegetative nervous orientation is parasympathicotonic, although there are not lacking signs of hypertonia of certain sympathetic tracts (cutaneous vasodilators, sudoriferous nerves). In this variety we find mild, and often partial, signs of constitutional hypothyroidism, to which there is a corresponding bodily morphology, such as characterizes megalosplanchnics—one still more exaggerated in the hypoevolutism of its proportions, with endogenous adiposity of greater or less degree uniformly distributed, a moon face, swollen lids and porcine eyes, scanty eyebrows, especially in the outer third, supraclavicular pseudo-lipomata, early baldness and white hair, an oily skin that wrinkles easily, a tendency to trophedema or myxedematous manifestations in the lower extremities, marked oligohemia and torpid lymphatism, and a tendency to migraine, constipation, muscular and articular pains, muscular asthenia and somnolence, especially after meals. These individuals are muscularly active but are slow in all their movements and in their psychic reactions; they possess average intelligence, never very high or brilliant. Their character is kind, cordial, expansive and optimistic. In these megalosplanchnics of hypothyroid coloring I find the sexual function well conserved and occasionally exaggerated; in women one may often note great fecundity combined with a genital sensitivity below normal.

In another variety, the *hypopituitary* or *hypothyroid-hypopituitary*, we find a special infantilism or puerility of countenance, with the hair of the mustache and beard thin and fine, associated with lower stature, a greater tendency to adiposity and accumulation of fat, especially on the lower abdomen, around the breasts and on the pubes, while the legs and arms appear relatively thin (in males). The skin has a delicacy and pallor; there is but little hair on any part of the body, and that very fine; the hands and feet are small, almost of feminine type (acromicria); the external genitals show a lack of development (the penis appearing as if buried in a small cushion of fat); sexual energy is deficient and there is frequently sterility, especially in females. The excitability of the vegetative and animal nervous system may, on the other hand, be higher, or at least an irritable weakness may be noted, contrasting with the constant characteristic torpor of the hypothyroid brachymorphic types. The character is good, but is subject to great changes of mood, to crises of overexcitement and depression and to impulsiveness.

In both these varieties oligohemia and lymphatism exist, and the blood-pressure is rather low. There is a great tolerance for sugar, with abuse of carbohydrates. In the hypothyroid variety the basal metabolism is diminished, while in the hypopituitary variety, according to Plaut's studies, it may be normal but with the specific dynamic action of the alimentation diminished.

Over against these two groups of megalosplanchnics, the *atonic* and the *flaccid*, so to speak, there must, according to the results of my investigations, be placed two other groups, the *hypertonic* and the *hypersthenic*, which I have characterized as the *hyperadrenal* and the *hypergenital variety*.

The hyperadrenal megalosplanchnic variety is marked by three dominant notes: the striking development of the heart, especially of its left portion and of the arterial system, with high arterial pressure (constitutional hypertonia); a richness of the blood (6,000,000 or more red cells per cubic millimeter) and excellent development of the skeletal muscles and muscular strength, with sometimes also a hypertrichosis. All these are signs that allow us to suppose, according to what we know of suprarenal physiology, that there is a constitutional hyperadrenalism. In these cases we are dealing with individuals who are the reverse of torpid, in whom both the sympathetic and the animal neurotonus are high. The character is active, impulsive, violent, restless and strong-willed.[1] When the skeletal muscles take on a particular development in this variety we have the athletic brachymorphic type.

In hyperadrenal megalosplanchnics we notice little tendency to truly pathological adiposity; there is no lymphatic plethora, and the skin is dry. The sexual function is normal; in some cases exaggerated. Not infrequently there are somatic signs in these individuals which lead us to suppose a concomitant hyperpituitarism (large hands, feet, face, coarse skin and a stature higher than the average).

The hypergenital variety is especially distinguished by the excessive development of the primary, secondary and tertiary sexual characteristics. The majority of these subjects are of low stature, with short legs, a large skull, early baldness and white hair, very poor teeth and a slight tendency to obesity. There is marked hypertonia of the vegetative and animal nervous systems, without the muscular development and arterial hypertension of the hyperadrenal variety. The character is euphoric and expansive, the imagination lively, while the intelligence may be but mediocre.

We can understand the importance of our division of the great megalosplanchnic group into two subgroups, one of which we designate as the *atonic* and *flaccid*, and the other as the *hypertonic* and *hypersthenic*. The first includes individuals morphologically hypoevolute in almost all their organs and apparatus, with a dominant parasympathicotonia and a torpid orientation of the animal nervous system and the psyche; with slow metabolism, lymphatic plethora, a deficiency in the development of the arterial portion of the heart as compared with the venous, and of the blood as compared with the lymph. The second subgroup includes individuals who have, superimposed upon their general megalosplanchnic bodily style, characteristics of hyperevolutism of the heart and arteries, or of the striated muscular system, the psyche or the sexual apparatus. They also show quite an active metabolism and no tendency to lymphatic stasis. Only such distinctions of variety as these and the possibility of ascertaining the presence of a special endocrine dominant in each one of them makes it possible for us to understand in clinical study the physiological tendencies and the sometimes apparently paradoxical dispositions of megalosplanchnics.

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[1] This is the brachymorphic variety which most nearly corresponds to the pyknic-plethoric and cyclothymic habitus, in which Max Löwy and Franz Kisch find hypovagotonism and sympathicotonism, or splanchnotonia, as Kisch says, because of a hypertonic condition of the abdominal vessels associated with cutaneous vasodilatation and a rosy color of the face and hands.

Thus, in accordance with physiological tendencies, we can explain why some brachymorphic types are torpid and somnolent, others vivacious and restless; some sexually active and very prolific, others sexually weak, with but little fertility; some powerful in their muscles, others flabby; some moist of skin, others dry; some lymphatic and anemic, others plethoric (the true apoplectic habitus of the ancients); some with hypertension, some with hypotension; some with mediocre intelligence and nonproductive, others with lively, vigorous mentality.

In the consideration of pathological tendencies we are immediately confronted by three large groups of diathetic disease manifestations which are easily coupled with the megalosplanchnic constitution. These are the so-called *arthritic, lymphatic-scrofulous* and *exudative* manifestations, to which we may also add the *vagotonic* and the *eosinophilic diathesis*, and, according to some authors, the *carcinomatous disposition.* It is difficult today to draw an exact line between the arthritic, the lymphatic and the exudative diathesis, either from the symptomatological standpoint or from the standpoint of their pathogenetic foundation—so difficult that some authors (Pfaundler, Heubner, F. Kraus) tend to identify them.

It is universally assumed that the Bazin-Lancereaux arthritism or herpetism generally attacks the apoplectic or brachymorphic constitution, which is for this reason also called the *arthritic habitus,* although there also exist thin microsplanchnic arthritics, as Castellino and Comby have clearly shown. As a matter of fact it is the megalosplanchnics who most frequently show the disease manifestations more characteristic of the great arthritic family; namely, symptoms of uricemia, gout, diabetes, obesity, asthma and asthmoid bronchitis, various chronic or recurrent rheumatisms, various forms of lithiasis and of pruritic and chronic or recurrent desquamative dermatosis—syndromes all grouped by the French school (Bouchard) under the one pathogenetic heading of *diseases of bradytrophism*, due to a slowing down of the nutritive movement.

That this bradytrophism must be the nutritive orientation characterizing the megalosplanchnic constitution, as tachytrophism characterizes the microsplanchnic, we understand very well today, since we know that the megalosplanchnic constitution resembles the infantile in its physical proportions and in the predominance of the vegetative life over the life of relation, and of anabolic over catabolic processes; also in the partial constitution of its organs, which are relatively very rich in more or less undifferentiated connective and lymphatic tissue, as compared with the poverty of development and of functional energy of the parenchymatous or differentiated tissue, analogous to that of infantile organs. This organic immaturity of the megalosplanchnics was well divined by De Giovanni, and it agrees with the results reached by the French school as to the tendency of the organs of arthritic subjects to sclerosis (fibroplastic diathesis) on account of the special primary hyperplasia and irritability of the visceral connective tissue. It also agrees with the results of modern investigations as to the relations between hypoplastic constitutions, lymphatism and connectival or fibrous diathesis of the organs which are assumed today by the Viennese school (Bartel, Wiesel).

In this way, therefore, we easily understand both the general bradytrophism of megalosplanchnics, resulting in products of imperfect metabolism and chronic autotoxemia, and also what we may term local bradytrophism, the nutritive torpor of the organs, leading to the accumulation of lymph and waste material in their *interstitium*, to reactions of the superabundant connective tissue or to fatty infiltration of this, and finally to sclerosis, to early aging of the organ, with premature involution of the constitutionally hypoplastic and undernourished noble elements.

But the fundamental determining principle of the megalosplanchnic constitution, namely, the morphological hypoevolution and the preponderance of the apparatus of the vegetative life over those of the life of relation, along with the special state of endocrine-sympathetic equilibrium coördinated with this ontogenetic error (see page 36), also explains the intimate coördination of the megalosplanchnic constitution and of the arthritic diathesis with other diatheses individualized by numbers of authors, such as the lymphatic, the exudative, the vagotonic and the eosinophilic diathesis.

Lymphatism, or *status lymphaticus*, must be regarded, according to the exact views of De Giovanni, which are confirmed by the modern ideas of the Viennese school, as a stigma of hypoevolution, as the persistence of a condition that exists physiologically in infancy, an anomaly that may also, as we shall see, graft itself upon a dolichomorphic or microsplanchnic constitution, but which naturally is much more common in the morphologically hypoevolute constitution of megalosplanchnics. The latter, especially during the early years of life, show the signs that have *ab antiquo* been attributed to lymphatics: a special pasty consistency, puffiness and fragility of the skin with a tendency to stasis and lymphatic exudations, from which comes a kind of chronic inflammatory swelling, especially of certain sections of the skin which are more delicate and more exposed to trauma, such as the lips, nostrils, ears, tips of the fingers and margins of the eyelids. An analogous lymphatic stasis and exudative tendency, together with hyperplasia of the follicles and lymphatic glands, may be observed in the mucous membranes in the form of swelling and adenoid hypertrophies visible in the nasopharyngeal mucosa and on the tongue, hypertrophy of the tonsils (palatine and pharyngeal), enlarged and palpable lymphatic glands in various regions, especially the cervical and inguino-crural. The fragility of the skin of these subjects and its special permeability, due to the size of its pores, favor the deep infiltration of pyogenic germs and of Koch's bacillus, and thus facilitate chronic and acute glandular inflammation, with suppuration from pyogenic germs associated or not with Koch's bacillus, especially in the cervical regions, giving rise to the clinical picture of scrofula, of which not a few adult megalosplanchnics show traces in persistent scars on the aforesaid regions.

The lymphatism of megalosplanchnics enables us to understand why these individuals are frequently subject to certain forms of tuberculosis, even though they are well-nourished and are at least apparently protected against the Koch bacillus by an abundant nutrition. The tuberculous infection that easily becomes implanted in infancy in the hyperplastic lymphatic apparatus, which is quite probably one with insufficient defensive powers, that is to say, an apparatus also functionally hypoevolute and, as Bartel believes, easily disposed to premature aging, produces in megalosplanchnics for the most part processes of adenitis or serositis of chronic course and attenuated virulence, and may secondarily attack the lungs, but without predilection for the apex—contrary to what occurs in microsplanchnics. And in the lung also the process runs a torpid course, takes on a mild, fibrous form and heals far more easily than in dolichomorphic constitutions (Fici).

With regard to the existence in megalosplanchnics not of the simple status lymphaticus but of the so-called *status thymicus* or *thymico-lymphaticus*, that is, of a serious constitutional anomaly, which, although closely coördinated with lymphatism must be kept sharply distinct from it, we may say that this condition is rare in megalosplanchnics, because few of those having such anomalies survive the period of infancy, since early death, due to *mors thymica* or acute infections, is usual; but, according to Wiesel's observations, many a thymico-lymphatic subject is clothed in the brachymorphic or square habitus. I may also add to this that I have often observed *mors thymica* take place in descendants of arthritics a few days or months after birth. We believe that there exist in these subjects profound anomalies of the endocrine equilibrium, such as genital and chromaffin hypoplasia combined with hyperplasia of the thymus—anomalies which are not found in the megalosplanchnic constitution, save perhaps in the variety which we have individualized as *hypopituitary*, in which constitutional hypogenitalism is frequent. In this variety we may also find persistence of the thymus as a consensual reaction.

We have already said that the hyperadrenal and hyperadrenal-hyperpituitary variety and also the hypergenital variety of the megalosplanchnic type escape all association with lymphatism. These varieties—the sanguine, the true apoplectic, muscular-hypersthenic and polycythemic, and hence the sympathicotonic—are those offering the most resistance to tuberculosis.

Coming now to Czerny's exudative diathesis, which has its preferred period during childhood, and especially in the period of growth in width of the organism, we see beyond a doubt how this readily becomes engrafted upon the overnourished megalosplanchnic constitution, disposed as it is to anomalies of metabolism, among which are included also those still little-known anomalies which lie at the bottom of the exudative diathesis. There are also, to be sure, thin microsplanchnic individuals who are subject to exudation, but often at maturity there occurs a transformation of the morphological type of these subjects, who acquire an impure megalosplanchnic type, due to the abnormal development of the abdomen and occasionally also of the thorax, while the extremities preserve the dolichomorphic type.

Now between the exudative diathesis of children and arthritism in adults there is such a similarity of symptomatology and possibly of pathogenetic foundation that Comby calls the exudative manifestations *infantile arthritism,* and almost all authors agree today that the *form* of the arthritic manifestations is somewhat different in infancy solely because of the special constitution peculiar to this age. The infantile constitution is characterized, as we know, by the marked development of the connective and lymphatic tissue, by the abundance of lymphatic fluids in the interstices of the organs, by the preponderance of the tonus of the excito-anabolic nerves (parasympathetic and vasodilator) over the excito-catabolic (sympathetic and vasoconstrictor), and, we may add, by the preponderance of certain hormones in the endocrine balance, such as those of the thymus and the pineal gland, over others less evolved functionally, such as the hypophyseal, adrenal and genital hormones. Since these are the hormones which stimulate the development and the excitability of the sympathetic nerves, and also the development and hardening of the skin and mucosæ, which, as we know, are very delicate, fragile and soft in the child, we are enabled to find in this endocrine-sympathetic condition of the infantile organism the explanation, on the one hand, of the ready appearance of phenomena due to hyperexcitability of the parasympathetic nerves, and, on the other hand, of the special localization of these neurovegetative disorders in the field of the skin and mucosæ, and, finally, to understand the special irritability and tendency to infection of the connective-lymphatic tissue, which functions actively in these first stages of life.

In the arthritic child there is a tendency, because of anomalous metabolism, for irritating toxic products of protein origin to accumulate in the blood and interstitial lymph of the tissues, and, to a peculiar degree, in the skin and mucosæ, which, according to modern ideas, possess the faculty of fixing or neutralizing circulating poisons (chiefly because of the activity of the cells of the Malpighian layer). These products of imperfect albuminoid metabolism stimulate tissues of this kind and render them abnormally sensitive, especially affecting the parasympathetic nerves, the vasodilators and the vasosecretors, which, as we have said, are already in a state of hypertonia in the normal child. In this way there arises in the arthritic child a state of unstable colloido-plasmatic equilibrium—a *colloidoclastic diathesis*, as Widal, Abram and Lermoyez express it—so that upon the slightest provocation, such as the ingestion of some ordinary article of diet, this equilibrium is upset and we have phenomena of protein shock, colloidoclasia, anaphylaxis, which manifest themselves with a whole train of phenomena varied in form but all possessing certain common traits, such as abrupt onset and termination, paroxystic course, predominance of phenomena of hyperexcitability of the vagoparasympathetic nerves and of paralysis of the vasoconstrictors, the dominance in the clinical picture of catarrhal or exudative and congestive phenomena and of transudation or secretion of lymph in the skin, the mucosæ and the interstitial tissues of the internal organs.

Now these are precisely the phenomena of the so-called *exudative diathesis*, which today attaches itself logically to the phenomena of anaphylaxis and to colloidoclastic diathesis, while the latter, in its turn, according to recent investigations of French authors in particular (Leopold Lévi, Tinel), presupposes a special constitutional hyperexcitability of the parasympathetic nerves, coördinated with a special endocrine imbalance (the thyroid instability of Lévi and Rothschild, and, in my opinion, a hypoparathyroidism associated with hyperthyroidism).

In arthritism this special hereditary soil is present, and the anomalous protein metabolism also furnishes various toxic products which act as sensitizing and anaphylactogenic substances.

Furthermore, according to results of modern investigations concerning the importance of the iso-ionia between Ca and K and their relation to colloidal equilibrium, we must assume that in arthritics with colloidoclastic diathesis there exists, along with hyperexcitability of the parasympathetic nerves, a tendency to deficiency of blood calcium and excess of blood potassium, with alkalosis and increase of the blood phosphate ions, just as occurs in spasmophilia and tetany following parathyroid deficiency. This chemical condition of the blood is coördinated with parasympathicotonia and becomes favorable to anaphylactic shocks, as also to hydrophilia, agglutination and flocculation of the colloids.

This holds true only for the pure parasympathicotonic brachymorphic variety, for in the sympathicotonic varieties the ionic equilibrium acts differently.

The manifestations of exudative diathesis are far more complex than those of lymphatism. We shall take from Comby the complete picture of this *infantile arthritism*, as he calls it, which serves as a prelude to the arthritism of adults.

The little arthritic, he says, is an intelligent child, with bright eyes and ready, quick movements. One may censure his restlessness, his lack of docility, his impulsiveness, irritability and inconstancy, but we must grant him a precocious mind, active will power, moral energy and an affectionate nature. Physically he develops in good condition; he is sometimes taller than other children of his age and also stronger. His skin is soft, fine and white, and transparent enough to allow the venous network to show through. He perspires readily, sometimes profusely and all over. Sometimes such a child shows an excess of fat of a watery nature, but one frequently finds fat babies becoming thin later on. These children often have rhinopharyngitis, tonsillitis and adenoids, with secondary adenopathies and glandular engorgements in the neck. Young girls frequently have a chlorotic appearance. Viewed from the angle of the circulatory apparatus, they generally have a rapid, unstable pulse and an irritable heart, especially as they approach puberty.

These children are emotional, they grow pale or blush readily and are subject to fainting fits. The upper air-passages easily become congested and colds are frequent; sitting in a draught or the mere passing from the sun to the shade causes repeated sneezing and in some cases spasmodic coryza, a kind of nasal asthma, which recurs readily. Epistaxis is equally frequent and may even assume a periodic form. Then there are the forms of spasmodic laryngitis—laryngitis stridulosa, spasm of the glottis, pertussoid crises—which recur upon the least exposure to cold; also tracheobronchitis, characterized by a recurrent, stubborn cough and accompanied by sonorous râles. Here we are already on the road to asthma.

In some cases we observe the alternation of eruptions of urticaria or eczema with crises of dyspnea. Nor is it rare to find certain acute pulmonary congestions, which occur either spontaneously or upon the occasion of a cold, fatigue or grip. These eruptions, crises and congestions are, however, of short duration.

Digestive disturbances are of paramount importance. Little arthritics often have big appetites, sometimes perverted even to the point of gulping down foreign bodies. They frequently have dirty-coated or fetid tongues, sometimes desquamating and spotted or like a map (geographic tongue) or deeply furrowed (scrotal tongue). All varieties of dyspepsia are frequent, especially atonic flatulent dyspepsia with abdominal distention and eructations. Acute auto-infections, feverish attacks of gastric disorder, with an exaggerated meteorism, borborygmus or pruriginous erythema may follow such dyspeptic states, and the so-called digestive fever is frequently observed. Constipation is habitual, sometimes obstinate, predisposing to mucous and mucomembranous enteritis, which is often complicated with appendicitis.

Hemorrhoids are also found in arthritic children, especially in adolescents. Sudden diarrheas, colics and periodic vomiting of several days' duration, suggesting meningitis, are not infrequent. The urine is generally turbid, intensely acid with very numerous crystals of uric acid or urate of sodium. In some cases albuminuria is observed without any other signs of nephritis; more rarely, glycosuria, acetonuria, phosphaturia, oxaluria and changes in the chlorides. Still more often we observe polyuria, spasm of the bladder and dysuria and occasionally renal and vesical lithiasis. In female children we find recurrent vulvitis and at puberty dysmenorrhea, menstrual irregularities, menorrhagia and leukorrhea.

The more obvious phenomena are those of the skin, which is delicate and irritable, reacting to even the slightest traumatic stimulus with localized swelling or an erythematous papule (Moro's *vasomotor test*). Under the influence of heat, and even more under that of wind and cold, the cheeks redden and the skin may chap. These children are readily subject to chilblains. In summer they perspire profusely and suffer at times from prickly heat, seasonal erythemas and hyperidrosis of hands and feet. Urticaria is quite common, and with it may appear all the various vasosecretory symptoms which we include today under the head of *Quincke's disease:* angioneurotic edema of the face, larynx, backs of the hands, joints, meninges (certain paroxysmal headaches due to hypersecretion of cerebrospinal fluid), etc., seborrhea of the scalp, pityriasis of the head, acne punctata and, especially, obstinate chronic eczemas, are common manifestations. Frequent also are the various rheumatic inflammations of the joints (including those of the spinal column), the muscles (wryneck, lumbago, myositis) and the bones, unaccompanied by fever.

Comby has furthermore described in children from the age of three years up an *arthritic* or *uricemic fever,* preceded and accompanied by sore throat and nausea, which occasionally assumes a strictly periodic course. As a rule, these exudative children show great thermic imbalance, instability of body weight, a tendency to edema and to accumulation of water and salt in the tissue,[1] and instability of the combining property of water in the tissues themselves, which Czerny calls *hydropic constitution,* and which, according to him, is favorably influenced by the limitation of carbohydrates.

All this complexity of phenomena of the exudative diathesis is often complemented by a train of nervous disorders both in the sphere of the vegetative nervous system and in that of the life of relation.

Neuro-vegetative disorders consist mainly, if not exclusively, of phenomena of vagal and parasympathetic hypertonia, which Eppinger and Hess have named *constitutional vagotonia.* This consists of an exaggerated oculo-cardiac reflex, respiratory arhythmia, bradycardia, hyperperistaltic phenomena, localized spasms in the stomach, intestine, bladder and uterus, mucous hypersecretion of the colon, bronchial and laryngeal spasm, etc.

Thus it is seen that the vagotonic diathesis is connected with the arthritic diathesis. The same may be said of the special frequency with which, in arthritic individuals, we also encounter eosinophilia of the blood, which is a satellite manifestation of protein intoxications and anaphylactic crises (*Stäubli's eosinophilic diathesis*). According to Benjamin and Rosenstern this hypereosinophilia varies from 8 to 20 or even 30 per cent.

Finally, it is not unusual to observe in these little arthritics spasmophilic and tetanoid phenomena of the striated muscles, hyperreflexism, tremors, choreiform twitching, jactitation, pavor nocturnus, subjective anxiety and epileptoid attacks.

The phenomena of infantile arthritism gradually decrease as the child matures, but even in the adult we can perceive signs of the diathesis in the skin and mucous membranes, such as obstinate localized eczema, chronic pharyngeal catarrh, recurrent nasal hydrorrhea, and, especially, asthma, asthmoid bronchitis and mucous colitis. During the years of full maturity the picture is dominated by the great syndromes of gout, chronic rheumatism, obesity, diabetes, arteriosclerosis and contracted kidney, the main diseases resulting from autointoxication, which are urged into manifestation by the endocrine-sympathetic imbalance of maturity and by the accentuation, during this age, of the decadence of those endocrine organs (thyroid, parathyroid, neurohypophysis, testicle, ovary, pancreas, etc.) which in megalosplanchnic arthritics are already in a state of primary functional imbalance.

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[1] K favors tissue hydration; Ca, which is deficient in these constitutions, favors dehydration.

Lastly, allusion must be made to the connection believed by certain authors to exist between the apoplectic constitution and the disposition to cancer. Beneke already speaks of a *carcinomatous constitution*, to which he assigns precisely the morphological attributes characteristic of the apoplectic or megalosplanchnic constitution. French authors similarly assume an association of the arthritic with the neoplastic diathesis, and R. Schmidt finds an association between the cancerous and the exudative diathesis. This would account for the antagonism which many authors (Rokitansky, Beneke, Claude, Herxheimer, Hoffmann, Reinhardt, etc.) claim exists between cancer and florid tuberculosis in the same individual, since the constitution predisposed to the latter, namely, the microsplanchnic, which we are about to discuss, is the opposite of the arthritic megalosplanchnic. According to Fichera's studies on humoral imbalance as predisposing to neoplasm, one of the most important factors must be sought for in hypergenitalism and in the hypofunction of the hemopoietic organs. We must, therefore, carry out studies to see whether the greater predisposition to cancer is found in our megalosplanchnics of the hypergenital variety.

MICROSPLANCHNIC HYPOVEGETATIVE CONSTITUTION.

Synonyms.—Rokitansky's phthisic habitus, Stiler's asthenic habitus, the first morphological combination of Beneke and De Giovanni, the muscular and the cerebral type of MacAuliffe (longilineal) dolichomorphic, the linear type of Stockard, the sthenoplastic type of Bounak.

The stature is often higher than the average, but it may be the average or less. The fundamental characteristic is a lack of trunk value in proportion to the value of the extremities, a dolichomorphic style of body, deficiency in weight (constitutional thinness) and in thickness of all the segments of the body.

The bodily style is marked by the deficient size of the abdomen in comparison with the thorax, by an exaggerated development in length, by the flattening of the trunk in the antero-posterior direction, the extreme narrowness of the hypochondria and the somewhat exaggerated length of the lower extremities in comparison with the upper ones and with the length of the trunk. This is true of the pure microsplanchnic type, while in another rather frequent impure variety the extremities, including the lower, may be short in proportion to the excessive length of the trunk.

Coming to the analysis of the separate bodily segments, we find the head greatly developed in the parietal and frontal regions, that is, it is very broad and has an extremely high vertical forehead, while the skull tends to be flattened in the occipital region. The breadth between the zygomata is striking, while the face is narrow below these, so that the two mandibles, meeting almost at an acute angle at the tip of the pointed chin, cause an oval form of face, with the large pole of the oval at the forehead and the small one at the chin. There are, however, microsplanchnics in whom the mandibles are longer and stouter, the chin wider, more prominent and lower. This gives a longer oval with the small pole less sharp. As a rule, the skull is rather small in proportion to the stature. But there are some microsplanchnics with large skulls (MacAuliffe's *typus cerebralis*).

The hair is thick, and may be more or less wavy and curled. Its implantation is very low on the forehead and temples. In many cases the implantation goes even a little below the median line of the forehead. The hair is somewhat coarse, often shiny. The scalp has no tendency to seborrhea or baldness. Some microsplanchnics, however, have fine, smooth, almost feminine hair.

The eyes of the microsplanchnic are usually large, with a long transverse diameter and protruding supra-orbital margins covered by long, thick eyebrows, which are often united over the root of the nose by more or less numerous hairs; similarly the tails of the eyebrows are sometimes prolonged to meet the hair on the temples. The eyelids are widely divergent, thin, not swollen, and the eyeballs are more often deep set than protruding. The glance is now gentle and appealing, now vivacious, brilliant, expressive and penetrating. Frequently the lower lid has a halo of dark bluish-brown pigmentation. The lashes are often long, with no trace of ciliary blepharitis. But we also find microsplanchnics with round, short, injected eyes, with swollen lids, conjunctivæ greatly reddened at the ciliary margin, and prominent eyeballs lacking in expression (vagotonic lymphatic-adenoid variety).

The nose is long and narrow, occasionally aquiline, often with more or less pronounced stenosis of the nasal cavities, and with deviation of the septum. We meet with some subjects, however, who have a nose of puerile type, more flattened at the base, shorter and with a more rounding point. Sometimes we find a nose with a broad ridge, and with nostrils drawn upward, characteristic of adenoid individuals.

In contrast with the length of the sharp nose are the shortness of the upper lip, the drawing in of the buccal portion of the face and, especially, the short, sharp, drawn-in chin, causing the profile to appear like the line of a bayonet or the trigger of a gun, formed by the line extending downward from the forehead along the ridge of the nose, bending backward to the mouth, then taking its second vertical path and descending to the point of the chin. This charateristic drawing-in of the mouth and chin is not found, however, in that microsplanchnic variety which we shall call the hyperthyroid-hyperpituitary, in which, on the contrary, there is a prognathism that is chiefly mandibular (page 113). The lips are delicate and thin, the cheeks smooth, without much fat, the zygomata readily visible, the ears rather long, with the pavilions sometimes turned slightly forward.

The facial coloring is almost always pale or of olive tint (in blondes it has a yellowish tinge). The skin is thin, smooth, with very little fat, in some cases modeled upon the bones, although we also find fleshy faces, with a fat and almost puerile appearance. The hair of the beard and mustache is now strongly developed, now delicate and of juvenile type which persists even in maturity. In women we frequently observe down on the upper lip and in front of the ears.

The teeth in microsplanchnics are often excellently formed, especially those of the upper jaw, though in the mandibles a certain irregularity of setting and superposition of teeth is not infrequent. There is little tendency to caries except in the case of hypoplastic microsplanchnics with hypoadrenal and lymphatic marks. The neck is long and thin, in some cases cylindrical (swan neck), in others forming an angle in front, owing to the striking protrusion of the thyroid cartilage (in males). This long neck, with the seventh cervical vertebra often very prominent, forming with the adjacent vertebræ a slight kyphosis, so that the head appears slightly inclined on the trunk, is perhaps the most characteristic and constant trait of the microsplanchnic bodily make-up.

Under the skin of the neck we can easily trace the sterno-cleido-mastoid and the upper margins of the trapezius muscles, which detach themselves from the line of the neck at a point well up, so that the line of the shoulders is very oblique and does not slope gently downward and outward as is normally the case. There is another variety of microsplanchnics, embracing those most predisposed to pulmonary tuberculosis, in which this shoulder line, after having sloped quite obliquely from the neck outward, rises again to joint the acromions, which are higher than the base of the neck.

The thorax is typically long, to such an extent that in some cases the last rib even touches the iliac crest; it is flattened in an antero-posterior direction as a whole, and still more so in its lower portion, having the lower opening very narrow and the upper one also markedly restricted, especially in the transverse direction, and sloping strongly downward and forward (with a very low jugular notch).

The cartilage of the first rib is often hypoplastic and prematurely ossified (Freund's sign). The cartilage of the tenth rib, and sometimes also that of the ninth, is free at its anterior end (Stiller's sign). The epigastric angle is very sharp and the ribs slope markedly downward. The intercostal spaces are very wide, the vertebral grooves pronounced, the costo-vertebral angles very acute, the sternum long, more vertical than in the normal, with its lower end strongly reëntrant. The diaphragmatic vault is very low (inspiratory and paralytic type of thorax). In a good percentage of microsplanchnics the thorax is enlarged in a transverse direction and flattened antero-posteriorly, and has in some cases a slight cervico-dorsal kyphosis. The girth of the shoulders also appears large on account of the abnormal length of the clavicles, which run in some cases horizontally and in others obliquely outward and upward, the acromions being raised. In view of the development of the transverse diameter, the circumference of the thorax at the level of the fourth rib may be found sufficient and in some cases even exaggerated.

In some subjects, however, the thorax is long but its horizontal diameters are uniformly restricted, and it tends to the cylindrical form. Finally, in the variety of microsplanchnic that we call hypogenital (eunuchoid), we have observed a small, short thorax, narrow laterally and prominent in front, with a wide epigastric angle and appearing encased, as it were, within the pelvis (true infantile type of thorax).

The abdomen is found restricted both transversely and in an antero-posterior direction, its size deficient in proportion to the thorax, with a special deficiency of the hypochondriac portion as compared with the lower abdomen, and with the umbilicus situated very high up. At times the belly is hollowed at the epigastrium and is round and prominent in the subumbilical portion (enteroptotic abdomen). The abdominal walls often appear hypertonic: they can be handled only with difficulty and have very lively muscular reflexes. Occasionally, particularly in women, they are flaccid and prominent.

It is not unusual in women for the hair distribution to come up from the pubes along the linea alba, or to be scattered over the intermammary sulcus or around the mammary areolæ. In both the male and the female we can observe a characteristic persistence and exaggeration of the so-called primary trichogenesis (hypertrichosis lanuginea), which forms an abundant down, especially on the interscapular space, the forearms and the legs. Terminal or definitive trichogenesis is, on the contrary, poorly developed, not so much because the definitive hair is not plentiful in the regions habitually covered with it (in the male the beard, mustache, the hair of the pubes, axillæ, anterior wall of the thorax and abdomen, the lower extremities and perineum; in the female the axillæ and mons veneris) as because this hair is often not very thick, and is fine, soft and imperfectly evolute as to pigment. In this connection we note the frequency in the phthisic habitus of *flavism* and *erythrism*, especially of the hair localized in certain regions (the genital, for instance), contrasting with the stronger, darker color of the hair on other parts of the body (dark hair, for instance, on the head, with a blondish mustache or reddish hair on the pubes, etc.). There is, however, one microsplanchnic variety in which we have a true diffuse hypertrichosis of terminal type (the hyperthyroid-hyperpituitary variety), just as, on the other hand, there is a variety in which there is a true pilar infantilism, a hypogenesis of hair of sexual character, and, in the female, a hair distribution of masculine type (hypogenital variety).

As regards the skeleton and the striped muscles, we find that the bones in normal dolichomorphics, who do not show marked stigmata of hypoevolutism, hypogenitalism or hypoadrenalism, are normally developed and normally resistant. In our hyperthyroid hyperpituitary variety the skeleton may be robust and the long bones long and at the same time thick. And although the bellies of the skeletal muscles may be long and slender, they do not in most cases present that flaccidity and weakness that are regarded as characteristic of individuals of the phthisic constitution. If there are *asthenics* who deserve to be so called from their poor skeletal muscles, there are others among them who have muscular strength and remarkable resistance, to such an extent (as we have several times been able to prove) that they have come out victorious in wrestling championships, or have shown themselves invincible in various forms of sport (boating, dancing cycling, racing, etc.), especially if subjected to long training.

Fom the point of view of behavior of the skeletal muscular system, to which, as is well known, there corresponds a parallelism of the circulatory energy and, we may add, also a richness of hemoglobin and abundance of red cells in the blood, we are obliged to divide the microsplanchnic constitution into two main groups, that of the *hypersthenic* or *hypertonic,* on the one hand, and that of the *asthenic* or *atonic,* on the other, as we have already done in the case of the megalosplanchnic constitution. As we shall see better later on, the true asthenic habitus of Stiler is that variety of the microsplanchnic constitution in which the dominant note is hypoevolutism of the cardio-arterial system, of the blood and of the muscular and ligamentous system, which is, according to the results of my investigations, coördinated with a state of constitutional hypoadrenalism, or of hypoadrenalism and hyperthymism together, and often also of hypogenitalism.

Studying now the distal portions of the limbs in microsplanchnics, we find the hands and feet graceful, long and slender, with rather long fingers and with the finger-tips not infrequently spatular. The arch of the foot is well pronounced. In many subjects the hands and feet, besides being long, are also broad (in our hyperthyroid-hyperpituitary variety). Stiler, however, very frequently finds acromicria in his asthenics, that is, small hands and feet with flatfoot (Mathes), which, in my opinion, is another argument in favor of the concept that I maintain, namely, that Stiler's asthenics are a hypoplastic variety of our microsplanchnic constitution (hypoadrenal or hypoadrenal-hypopituitary variety). On the other hand, in subjects in whom hypogenitalism dominates, the hands may be exceptionally long and almost like those of a skeleton, owing to the marked thinness of the phalanges, the pointedness of the tips of the fingers and the adherence of the skin, which is extremely poor in subcutaneous tissue, to the bones. Not infrequently the hands and feet in microsplanchnics are bluish and covered with a cold perspiration, with the veins on the back of the hands swollen and plainly visible, but in many other subjects we find, on the contrary, warm hands of healthy coloring and with warm perspiration.

We have pointed out that the microsplanchnic has a tendency to macroskelia, but a good percentage (40.5, according to Viola and Fici) are brachyskele, of less than average stature, but still preserving the very pronounced dolichomorphic style, especially in the trunk.

With regard to sexual development, we find in the microsplanchnic constitution a rather variable and at times paradoxical behavior. In a large number of cases the primary and secondary sexual characteristics are pronounced in the male, but yet there is often present some somatic or psychic sign of feminism (for instance, a large pelvis and protruding buttocks, due to an accentuated lumbar lordosis, and a very small waist). Very often at puberty we find a mild eunuchoid constitution, which becomes modified in later years. The external genitals are not, as a rule, much developed and the penis is thin. The generative instinct may be strong, but is subject to crises of frigidity and the sexual power is limited. In dolichomorphic females we often note a narrow pelvis, small breasts, a hypoplastic uterus, masculine distribution of the hair and limited fecundity.

There are microsplanchnics, however, in whom this tendency to hypogenitalism or dysgenitalism is far more obvious, so that we speak of a *hypogenital form*, which appears at times in the male as a mild feminism, or in the female as a utero-ovarian hypoplasia without marked eunuchoid proportions of the skeleton; or it may at times even take the typical form of eunuchoidism. Puberty, as a rule, arrives early in microsplanchnics, especially in males, but is very often dissociated and prolonged. In females dysmenorrhea is frequent, as are also periods of amenorrhea.

Coming to the condition of the internal organs, we find that the heart in these constitutions is often small, and tends to assume a vertical position; at times (but not always, as some believe) we have the so-called *drop heart*. In these small hearts we notice, as De Giovanni and Beneke have already shown, a preponderance of the right side of the heart over the left, and of the pulmonary artery over the aorta. The aorta is often narrow and quite long, and the general arterial system is very little developed in comparison with the lymphatic-venous system (De Giovanni, Brugsch). Hence the arterial pressure is habitually low, and the pulse rapid and very unstable. We find these conditions most frequently in adolescent and young microsplanchnics. But in adults the circulatory apparatus does not very often correspond to this hypoplastic type, as I have found from my many observations, which are in accord with some recent observations, as yet unpublished, of Gagliardo (of our school) and Brugsch.

The heart may in fact be absolutely and relatively of proportionate size, or even larger than the normal. When this is the case in the adolescent possessing a very narrow thorax it is accompanied by those phenomena which go under the name of *growth hypertrophies* or, better, *cardiopathia adolescentium.*

The aorta may also be well developed, and the arterial pressure be within normal limits, or even slightly above. In these microsplanchnics of well-developed cardio-arterial system the skeletal-muscular system and the muscular strength are also good, as we have already said. I have noted in these hearts a sympathicotonic orientation or phenomena of sympathicotonia easily alternating in the same subject with vagotonia—in short, a hyperexcitability of the extracardiac nervous system. The reflexes of tonicity are also quite marked. From my researches I find that it is definitely in low-grade microsplanchnics, of pure hyperthyroid or hyperthyroid-hyperpituitary type, that we encounter a good conformation and energy in the circulatory apparatus, while a marked hypoplasia of this is found habitually in subjects in whom hypoadrenal and hypogenital symptoms are manifest. In these same subjects a lymphatic, chloro-anemic character of the blood is common, as is also, according to some of our investigations, an habitual hypoglycemia, while in microsplanchnics with sufficient cardio-arterial and muscular development the blood is normally constituted and hemoglobin and blood-sugar values may even be above the average.

In the respiratory apparatus an exaggerated size is characteristic, especially as regards length of the lungs, and particularly when these are considered in relation to the heart. From this condition spring two facts which are today regarded as of the greatest importance in the genesis of predisposition to pulmonary tuberculosis. There is, in the first place, an excessive distance of the apex from the hilus, too long an apical bronchus running almost parallel to the trachea, making it difficult for dust and bacilli that reach the apex to find their way out again, owing to deficient ventilation of the apical section of the thorax, and also impeding the arterial inflow into the apex and the outflow of lymph from it (Tendeloo)—a condition tending to produce chronic lymphatic stasis and ischemia of the apex, which is furthered favored by the accumulation of foreign bodies. Added to this is the deficient nutrition of the entire lung, resulting from the disproportion between the left heart and the size of the lung. Freund and Hart, as is known, have also assigned importance to the stenosis of the upper thoracic opening (page 106), which they claim impedes the expansion of the apex and obstructs its venous circulation. However, the more recent investigations of Iwasaki, Wenckebach, Neumann and of J. Bauer tend to invalidate Freund's sign.

On the other hand, the formation of the nose, which, as has been pointed out, is often flattened transversely and stenosed, plays a determining rôle in the formation of the narrow and paralytic thorax of the microsplanchnic—a nose which, we may add, is easily subject to a neuro-secretory swelling of the mucosa, which increases still more the difficulty of the passage of the air through the nostrils.

As regards the digestive apparatus, many microsplanchnics have an atonic and ptotic stomach, long and vertical, sometimes small, sometimes dilated through atony. The small intestine is relatively short. The colon is often atonic, distended by gas, ptotic and movable. But all this does not follow a fixed rule, as is generally believed. There doubtless does exist the atonic and asthenic microsplanchnic type described by Stiler, with hypochylia, poor appetite, difficulty in ingesting and assimilating a large quantity of food, etc., but we meet every day long, thin individuals who are insatiable eaters and who digest rapidly, yet never grow fat. Moreover, a chemical examination of the microsplanchnic's stomach often reveals high values in hydrochloric acid, just as an examination of the motility shows an active peristalsis and rapid emptying. The same can be said of the motility of the colon.

From the point of view also of the digestive apparatus I think we must make a distinction between the asthenic and the hypersthenic variety of microsplanchnics. We may mention the special tendency of young microsplanchnics to typhoid fever. Moreover, the liver in microsplanchnics is not always small, as Beneke and De Giovanni assume; sometimes these subjects have the so-called bilious temperament, a tendency to cholemia, especially from emotional causes.

In arthritic microsplanchnics hemorrhoids are frequently found, even in the young. The kidneys exhibit marked weakness, as is shown by the frequent finding of the so-called physiological albuminuria, of orthostatic albuminuria, characteristic (though not exclusively) of the atonic or orthotic (Pollitzer) habitus; also by the frequency of phosphaturia and psychic glycosuria, as well as by a tendency to renal congestions, to acute nephritides, especially of congestive type, while cases of contracted kidney, which, as we know, are common in the megalosplanchnic constitution, are very rare in microsplanchnics.

We may also mention oligodipsia, a deficient tendency to the ingestion of water, as characteristic of many microsplanchnics, in contrast to what exists in megalosplanchnics. With this *constitutional oligodipsia* (Schmidt) there may be a corresponding *habitual oliguria*. In microsplanchnic constitutions of arthritic origin we may also come across uraturia and lithiasis.

There has been no systematic research undertaken of the metabolism of healthy microsplanchnics by means of the study of basal metabolism, but from the morphological imbalance existing in these subjects, which consists in the deficient development of the system that assimilates energy in comparison with that of the system which consumes energy, and from the bradytrophic orientation of the opposite morphological type of megalosplanchnics, we may conclude that microsplanchnics have an accelerated metabolism, a tachytrophism, with a tendency to *deficit* of the nutritive balance, whence comes their habitual thinness. This is true for the pure microsplanchnic type, with hyperthyroid and hyperthyroid-hyperpituitary dominant, while in impure varieties, either hyposympathicotonic or vagotonic, the thinness may be interpreted in another way, not as the effect of an increase in the basal metabolism but as the result of a deficiency in absorption and assimilation of food, owing to a miopragic state of the digestive apparatus or of the organs which produce assimilative enzymes; or it may be regarded as the effect of a rather faulty adipogenetic capacity on the part of the tissues (Brugsch).

We have already pointed out that microsplanchnics also may exhibit symptoms of exudative diathesis. According to Lederer's investigations, the great instability of the fixation of water in the tissues and blood is characteristic of this diathesis, on account of which the body easily loses or retains water and hence loses or puts on weight. It seems, according to Metchnikoff, that the tissues also possess the same readiness to retain or to lose chlorine. Niemann, moreover, has established in exudative diathesis an increase in the metabolism of calories and in the production of CO_2 and a tendency to increased production of heat.

Now a certain proportion of microsplanchnics have this very characteristic of varying in weight from one day to another, chiefly on account of psychic disturbances, besides having increased oxidizing processes and hence an increase of thermogenesis, as we have already shown.

My studies of the vegetative nervous system and of the endocrine system have brought out some rather interesting facts in the determination of the physiological personality of these constitutions. In the pure microsplanchnic type, that is, the type in which we find all the signs of an advanced differentiation both in the external forms of the body and in the internal organs, without arterial hypoplasia, without hyperplasia of the lymphatic tissue and thymus, without hypogenesis of the muscular system and of the sexual characters—in other words, without any stigmata of organic immaturity—we find for the most part a predominance of the tonus of the sympathetic nerves, which is revealed by habitual tachycardia, reflex hypertonia of the cardiac muscle, often also by hypertonia of the small arteries of the periphery, by a tendency to cutaneous angiospasm, white dermographia, hyperidrosis, ready inhibition of gastric peristalsis and of hydrochloric acid secretion, poor salivary and lacrimal secretion, mydriasis, cutaneous hyperthermia, especially in the hands, a not infrequent emotional glycosuria and exaggerated reaction to adrenalin.

Side by side with this microsplanchnic type, which is predominantly of sympathicotonic orientation, and which, on the endocrine side, shows very numerous stigmata of hyperthyroid or hyperthyroid-hyperpituitary temperament, we meet numerous individuals in whom the tendency of the vegetative nervous system is decidedly vagotonic and parasympathicotonic. Thus we can understand why Max Löwy finds vagotonia in schizothymic asthenics. We have only to read the monograph of Eppinger and Hess on vagotonia to observe that the morphological type which they have assigned to the nervous anomaly they describe corresponds to the microsplanchnic constitution, and definitely constitutes the one or the other of our asthenic and immature varieties of the microsplanchnic habitus. Now in these vagotonic microsplanchnics I find, what Eppinger and Hess have shown to exist, habitual signs of a pronounced lymphatism, often also of adenoidism, besides numerous hypoevolute manifestations which have to do with the circulatory apparatus, the blood, the muscular system and the sexual apparatus; what is more, symptoms of hypoadrenal, hypogenital and hypoparathyroid temperament abound. The combination or alternation of symptoms of vagotonia and of sympathicotonia is frequent in this latter spasmophilic group of microsplanchnics.

It is in these microsplanchnics with marked irritability and instability of the vegetative nervous tonus, even though the parasympathetic tonus preponderates more frequently, that we observe symptoms of exudative diathesis, which is based, according to L. Lévi, on constitutional thyroid instability and, as we believe, on a disharmonious constitutional hyperthyroidism, since it is combined with lymphatism, hypoadrenalism, hypogenitalism and, especially, hypoparathyroidism.

From the point of view of the animal nervous system we find atonic and asthenic microsplanchnics, as we have already stated, but there are likewise normotonic and even hypertonic and hypersthenic microsplanchnics (these last being found in the group of the hyperthyroid-hyperpituitary variety). Generally, however, the animal nervous system shows erethism, great instability and a tendency to crises of exhaustion. A marked characteristic is *tachypragia*, the great swiftness of all psychic reactions, and the muscular and cerebral unrest; Kretschmer finds the schizothymic temperament to be very frequent, as we know; this is especially marked in hypogenital microsplanchnics. Intelligence is often well above the average, although defective and feebleminded microsplanchnics are not wanting. Many microsplanchnics of hyperthyroid variety also show that alteration of character which is strictly related to the epileptoid reaction, and which Buscaino calls *constitutional cenesthopathy.*

As regards the pathological dispositions of microsplanchnics, we find that these subjects are very susceptible to tuberculosis, those individuals who are without stigmata of hypoadrenalism associated with hyperthyroidism or hyperthymism being definitely the ones predisposed to apical tuberculosis, while the lymphatic, hypogenital and hypoadrenal microsplanchnics are especially liable to tuberculosis of the serous membranes, the glands, intestine, suprarenal capsules, kidneys and brain.

Microsplanchnics also show a strong tendency to typhoid, dyspepsias, progressive pernicious anemia, round ulcer of the stomach and duodenum, neurasthenia, cardio-vascular neuroses, Basedow's and Addison's diseases, schizophrenia and, according to R. Stern, to tabes (general paralysis, on the contrary, having a predilection for megalosplanchnics). If microsplanchnics succeed in escaping Koch's bacillus they may live to extreme old age, and the resistance of their hearts to all toxic, infectious and psychic disturbances is especially remarkable, whereas in megalosplanchnics the same causes succeed far more readily in wearing out and exhausting the myocardiac fiber, in eroding the walls of the nutritive arteries of the heart or injuring the valvular apparatus.

However, we must reflect that microsplanchnics, because of morphological hybridism, often show characteristics of abdominal megalosplanchny or, as age advances, they undergo modifications through marked abdominal development and sometimes also through development of the thorax, as De Giovanni has observed and as Viola's and Fici's investigations have recently confirmed. In this case microsplanchnics also may assume the disease tendencies which characterize megalosplanchny and, especially, tendencies to abdominal venous plethora and to arteriosclerosis.

STATUS DEGENERATIVUS OF J. BAUER. STATUS HYPOPLASTICUS OF BARTEL. INFANTILISM. DWARFISM. GIGANTISM.

J. Bauer thought of individualizing under the term of *status degenerativus* the accumulation, in a given subject, of extreme variants of this or that constitutional characteristic, which, taken alone, has no importance or is of little pathogenetic value, such as a scaphoid shoulder-blade, a supernumerary breast, a deformed ear lobe, an anomalous distribution of hair, etc. When, however, these are found combined in the same individual they indicate that the individual represents a type of general constitution which deviates too much from the average type of the species, and hence must be regarded biologically as an *inferior being* affected by a *despeciation*, as Apert calls it, or by *degeneration*, if we mean by this, as Bauer does, simply a marked deviation from the type of the species, independently of the medico-legal value of the deviation itself. Today there can be no doubt whatever that these extreme variants from the average type are in effect constitutions physically, or, better, psycho-physically, inferior, and to prove this it would suffice to point out the infinite series of positive data (in biology negatives have extremely little value) accumulated in the school of Lombroso, and the daily observations of all physicians of a great number of degenerative stigmata in tuberculous and neuro-psychopathic individuals.

Systematic investigations conducted by Zielinski upon 854 cadavers of consumptives have shown skeletal anomalies to be singularly frequent, such as a depression in the region of the small fontanels, persistence of the interfrontal suture to an advanced age; the presence of Wormian bones, abnormal length of the transverse processes of the last cervical vertebræ, the duplication of the point of the spinous processes in the last thoracic and first lumbar vertebræ, excessive protrusion of the first dorsal vertebra, which becomes, as it were, an additional prominent vertebra, protrusion of the body of the fourth lumbar vertebra like an accessory promontory, the duplication of the sixth and seventh ribs, especially on the left side, the bifurcation of the ensiform apophysis of the sternum, floating ninth and tenth ribs, etc. In the internal organs Zielinski found absence of the middle lobe of the right lung, marked cardiac hypoplasia, a narrow aorta with thin walls, bifurcation of the aorta as high up as the second or third lumbar vertebra, the kidney or liver occasionally lobed, abnormal length of the right lobe of the liver, horse-shoe kidney, absence of one kidney, absence of the renal pelvis with reduplication of the ureters, accessory spleens, fetal position of the stomach, abnormal length of the mesocolon and mesocecum, an abnormally long and conical appendix, Meckel's diverticulum and patency of the inguinal and umbilical canals.

Similar findings have been brought out by Kwiathowsky and Polansky. Hart and Hegar add to this their observation of genital infantilism in some consumptives. Other abnormalities observed are polymastia, an undersized nipple, especially on the side of the tuberculous lung, unequal size of the breasts (Sorgo and Suess), absence of hair in the axilla of the affected side (Godin), the more pronounced pigmentation of the iris on this side (Herbert) or warty and pigmented moles on the same side (E. Stern), vascular moles at the edge of the hair on the nape, cutaneous ichthyosis, extremely frequent adhesion of the ear lobes or developmental defects of these (Rossolimo). Erythrism of the hair and the *pilar disharmony* so named by Schmidt are frequent in consumptives.

This picture of somatic degeneration may be completed by numerous stigmata of psychic degeneration (especially schizothymia and schizophrenia). It shows very well what Bauer means by *status degenerativus*. Naturally we can include in this any extreme local or general variant of constitution. Our microsplanchnic and megalosplanchnic constitutions also, at their purest, that is, in their extreme specimens, represent true degenerative states, in which we are in reality far from the normal type of the species. Now it is precisely these extreme variants that are of greatest importance in pathology, because they are, as a rule, correlated with a strong *morbility*, since they are themselves as a matter of fact true disease conditions (see above).

According to Bauer, the status degenerativus predisposes not only to tuberculosis but also to the various diseases of the glands of internal secretion, especially to Basedow's disease, goiter and status thymicus; in this last, as a matter of fact, anomalies and malformations of the tissues abound. Among these anomalies Bauer also places, as a manifestation of the status degenerativus and not as a consequence of the coëxisting endocrine alteration, what he calls *degenerative formula of the white blood cells*, that is, lymphocytosis and mononucleosis with neutropenia, which, he says, is frequent among certain peoples (Tyrolese, Greeks, New Guineans) and accompanies the most diverse constitutional syndromes, such as diseases of the thyroid, the hypophysis, the suprarenal glands and the thymus; obesity and diabetes mellitus, eunuchoidism, castration syndromes, amenorrheas, hemophilia, chronic rheumatism, hypochlorhydria and achylia, chronic gastro-intestinal diseases, especially ulcus ventriculi; tabes dorsalis, epilepsy, paralysis agitans, dementia praecox and many neuroses.

Bauer rightly includes in status degenerativus not only those variants that are *extreme in deficit* but also those *extreme in excess*, because, as we already know, these too are, for us, from the biological and medical point of view *inferiorities*, constitutional inadequacies, even though the popular mind regards them as an index of *superiority*. This must be said of all one-sided plus-variants—for example, mathematical, linguistic, artistic and literary geniuses. As Julius Paulsen says, the same condition, for instance, a poverty of cutaneous pigment, may be, for the theory of descent, a *mutation in loss;* for anthropology, a racial deviation, a *variation;* for medicine, a *degeneration;* for popular politics, the index of a chosen race.

Moebius claims that bodily ugliness must also be considered in general a sign of degeneration.

Naturally not only extreme morphological variants but also extreme physiological and psychological variants belong in the status degenerativus, and in the analysis of this we must never forget that it is not the single degenerative stigmata in themselves that determine the biological inferiority of the individual. Rather is such inferiority determined by the total individuality on which they are grafted and upon which they leave an imprint, since such stigmata, if numerous, are indices of an anomaly of form and function of far greater extent in the organism.

Bartel has included under the term of *status hypoplasticus* (or *hypoplastic constitution*) the entire constitutional complex characterized by hypoplasia, by deficient evolution of the various organs and systems, with a tendency (and herein lies the essence of the author's conception, which is anything but new) on the part of the connective tissue to replace the elements constituting the parenchyma, which easily undergoes atrophy. Other characteristics of these hypoplastic constitutions are said to be the excessive primitive formation and the poor functional capacity of the natural defensive apparatus and of the lymphatic system (Wiesel). Hence the cornerstone of the edifice of Bartel's status hypoplasticus is the hypoevolutism of the organs and the ready aging of the differentiated elements, on the one hand, and the fibrous diathesis, hyperplasia and fibrous atrophy or sclerosis of the lymphatic tissue, on the other.

But it is evident that there is no reason for inventing a new term to designate what, ever since De Giovanni published his studies, we know as organic immaturity, as hypoevolutism, a condition which for De Giovanni meant precisely the persistence in the organs of an excess of tissue of embryonal or undifferentiated character at the expense of the differentiated tissue, persistence of the supporting connective tissue at the expense of the epithelium, and persistence of the lymphatic tissue in general (page 91).

Bartel's status hypoplasticus embraces, therefore, both the *fibroplastic diathesis* and *lymphatism*, which, as we already know, are characteristics of arthritism and of megalosplanchnic constitutions —constitutions which are morphologically hypoevolute, as Viola has shown.

According to Pfaundler and Stoerk, status hypoplasticus and lymphatism represent one and the same condition. These authors, in fact, interpret lymphatism as the expression of a congenital insufficiency and of an abiotrophy of the mesenchyma and its derivatives.

One of the most important manifestations of the status hypoplasticus according to Wiesel and Bartel, is the *status thymico-lymphaticus* of Arnold Paltauf, to which Wiesel adds the hypoplasia and sclero-atrophic diathesis of the endocrine glands, which would thus represent the chief pathogenic substratum of status hypoplasticus, and hence also of status thymico-lymphaticus. The latter is characterized by the presence of an abnormally large thymus and by a general hyperplasia of the glands, by the existence of both solitary and agminated follicles, and by a dissemination of hyperplastic lymphatic tissue throughout the body, though naturally this is more accentuated in certain regions. Very characteristic is the visible hyperplasia of the nasopharyngeal lymphatic tissue, that of the follicles at the base of the tongue, and also the hyperplasia of the spleen (Malpighian follicles) and of the intestinal mucosa.

According to Wiesel, the thymus tissue is for the most part of epithelial type, with abundance of medullary substance and of Hassall's corpuscles. But either the lymphoid or the epithelioid part may be hyperplastic, the former being more likely to be predominantly so.

The coëxistence of other serious endocrine anomalies is habitual. Among these the greatest importance has been attached to hypoplasia of the chromaffin tissue, which, according to Matti and Hornowski, is closely coördinated with thymic hyperplasia, while Hedinger and Wiesel correlate it with the status lymphaticus which accompanies status thymicus, and which, as Hart, Hedinger, Wiesel, myself and others have maintained, may become dissociated and be found independently of status thymicus.

Other endocrine anomalies correlated with status thymicus are hyperthyroidism, hypopituitarism of puberty and also that due to tumors of the hypophysis and hypogenitalism. In connection with this last Bartel and Hermann have described the early sclerosis of the ovaries and Kyrle that of the seminiferous tissue of the testicles in thymico-lymphatic subjects.

We have found interesting changes in the circulatory apparatus, such as an abnormally small or a considerably dilated and flaccid heart, with lymphoid nodules disseminated throughout the myocardium, hypoplasia of the aortic walls and premature sclerosis (Wiesner), hypoplasia of the arteries, cerebral hypertrophy, anencephalia, hemicephalia, cerebral tumors, especially gliomas; abnormal length of the intestine and appendix, abnormal lobulation of the lungs, and genito-urinary anomalies. All these coincidences demonstrate that status thymicus represents a serious manifestation of Bauer's *status degenerativus*.

No constant morphological constitution is found for status thymicus. In some cases, according to Wiesel, we deal with muscular subjects with square frames. In children, however, despite a condition of apparently good nutrition, the skin is soft, of a pasty consistency, pale and chlorotic, and the color of the face is leaden. These are children who are extremely susceptible to acute infections, scrofula, eczema, rickets and anaphylactic crises. In adolescents and adults, on the other hand, there may be a dolichomorphic constitution, with rather slender long bones and retarded ossification of the epiphyseal cartilages. In boys we frequently find a certain feminine conformation of the skeleton, a distribution of fat and hair of feminine type, hair scanty and thin in the axillæ, on the face and perineum, Adam's apple only slightly pronounced, a high voice and rather small external genital organs. In some cases we have cryptorchidism or gynecomastia, and in some homosexuality. In women we often find a chlorotic color, retarded puberty, narrow pelvis, breasts and hair of the mons veneris poorly developed. Sometimes, as in one case that I have used as an illustration, the muscles of the limbs show an exaggerated development.

According to Hoxie, these hyperthymic adults have a subnormal temperature. They have the characteristics of the asthenics: little muscular energy, in some cases the phenomena of pseudo-paralytic myasthenia; cardio-vascular asthenia and arterial hypotension, a tendency to faint and to develop edemas, especially in the face. According to Eppinger and Hess, in the reactions of the vegetative system the tonus of the parasympathetic nerves predominates. Gastric ulcer and spastic constipation are not infrequent.

There is a chlorotic state of the blood, with lymphocytosis, monocytosis and neutropenia; eosinophilia and the hemophilic state are frequent. Especially characteristic is the liability to sudden death from incidents of very little importance (bathing, emotion, infection, minor surgical operations, anesthesia). The frequency with which status lymphaticus is found in the cadavers of suicides deserves to be pointed out (Bartel, Brosch, Hammar, Neste, etc.).

Status thymico-lymphaticus, according to what I have maintained (and in this I am upheld by Lubarsch), may be primary and congenital, or it may be acquired secondarily in extra-uterine life, especially through changes in other endocrine glands, occurring before the period of the physiological involution of the thymus (Basedowian hyperthyroidism, hypogenitalism, hypoadrenalism, pituitary tumors). Pighini has also assumed the occurrence of status thymicus, ending in sudden death, as the result of repeated psychic traumatisms.

From Bartel's *status hypoplasticus* we pass easily to *infantilism,* by which we mean those anomalies of general constitution characterized by the persistence of the morphological-physiological-psychological constitution belonging to childhood up to an age which is no longer infantile.

Infantilism is, therefore, a special case of hypoevolutism which concerns the bodily mass as well as the proportions, the soma as well as the psyche, although in different degrees, now one, now the other, being more affected, and the individual, who has either reached or passed the puberal crisis, is left in the somatic-psychic condition of the infant or child (in this latter case we speak rather of *puerilism*). Accordingly, not every hypoevolutism is an infantilism. If, for instance, we are dealing with a hypoevolutism of mass in a case of normal morphological evolution, we cannot speak of infantilism but of *microsomia*. If the organism has the mass and proportions corresponding to the age, but lacks the development of sexual characteristics, we cannot speak of infantilism (as is erroneously done by many) but of sexual hypoevolutism or hypogenitalism, even though the features may have puerile traits. Nor is it permissible to speak of infantilism, as was recently done by Borchardt, when the adult subject is backward in development so that he looks years younger than his age!

Is it possible that we confound *juvenilism*, that is, a persistently youthful appearance of the body in an individual of mature years, but with all the signs of having passed the puberal crisis, with *infantilism*, with forms and characteristics of the puerile or of the infantile impuberal body? Here we are dealing with general hypoevolutism, not with infantilism, and in order to avoid misunderstanding it is preferable to speak of *partial hypoevolutism* (not partial infantilism) when there is retarded development of individual parts of the body.

At any rate I believe it necessary to point out that clinical experience teaches that there is no strict boundary line between true infantilism, in which the signs of the puberal crisis are completely absent, and certain forms of general hypoevolutism, characterized by hypogenesis and prolongation or even lifelong persistence of puberal characteristics, owing to which the individual seems an eternal adolescent, having secondary characteristics developed, but not completely so, with stature in some cases below and in others above the normal. In the latter case we speak of *persistent puberism*, while infantilism is by definition always an *impuberism*. But from the pathogenetic angle as well, there is often nothing but a difference of degree in the fundamental alteration between these two conditions. The more difficult problem to be solved is whether by infantilism we should mean only uniform inhibition of the growth of all parts of the body, with a persistence in the subject of characteristics belonging to a considerably earlier, infantile phase of development, or whether, in the syndrome of true infantilism (by which we always mean universal infantilism) we may also encounter phenomena of unequal hypoevolutism in the various parts, although the deficiency in growth affects the entire body.

This question is of considerable importance, because today many authors, such as Mathes, Falta, Bauer and Borchardt, choose to regard as true *infantilism* only that which shows an equal and uniform developmental inhibition of the whole body, a condition which, as Bauer himself recognizes, is exceptional in comparison with the great majority of infantile cases, in which hypoevolutism involves now one and now another tissue of the body. In these latter cases it is almost always possible either clinically or pathologico-anatomically to trace the origin of the general developmental anomaly to an hereditary, congenital or prematurely acquired alteration of the endocrine glandular system.

For the above authors these endocrine infantilisms are not true infantilisms; they are diseases of the glands of internal secretion!

I have elsewhere tried to show how fallacious and arbitrary is such a distinction, and that it is by no means upheld by rigorous clinical analysis.

Suffice it to say that Borchardt, even while maintaining that the charcteristic property of true infantilism is the *uniform* inhibition of bodily development, recently included among cases of true infantilism the dysglandular as well. This view was, on the other hand, lately opposed by Bauer, who holds that the endocrine alteration, even if pluriglandular, can create only a *partial infantilism,* not true universal infantilism, for the reason that the individual glands stimulate or inhibit the development of this or that tissue, not the development of the organism as a whole.

De Sanctis rightly observed some time ago that an infantile person is always a sick person, and is not like an *infant with its normal form.* In other words, we cannot pretend to find in a very severe developmental disease the regularity of physical proportions belonging to a given normal age of growth. Why should we not consider just as truly infantile a subject with an infantilism that is universal but disharmonic? The fact is well established today that an alteration of the hypophysis in adolescence may create a classic form of arrested development at that morphological phase which the individual had reached at the time the hypophyseal lesion began. This type of infantilism is uniform, without the concomitance of adipose dystrophy so frequent in other forms of pituitary infantilism. Cases of this sort accompanied by diabetes insipidus have been observed by Strauss, Weber, Mamrot, Zundel, Borchardt and myself. A mild hypothyroidism may, I believe, produce alongside of the more generally known form of myxedematous infantilism a form of typical universal uniform infantilism in which it is very difficult to diagnose the endocrine origin without the aid of the therapeutic criterion. Cases of this kind are not infrequently observed at the age of puberty, especially in heredo-syphilitics. In some instances these conditions become modified at a later stage of life.

Hence the affirmation of Falta and Bauer that an endocrine change cannot produce a true uniform universal infantilism is inexact. This opinion is shared by Biedl. Falta finds himself at a loss in differentiating the cases in which an endocrine origin is strongly suspected from his cases of *echter Infantilismus*. On the other hand, the endocrinological concept of Bauer cannot be upheld, to the effect that the endocrine glands do not stimulate or inhibit the development of the organism as a whole, but only that of certain tissues. Supposing this to be true of each separate gland (and it is not valid for the thyroid, whose stimulating action is universal), it is certainly not true of the entire hormonic system considered in the totality of its regulating action upon normal growth.

If we assume a hypoplasia, a uniform hypofunction of the endocrine system, which, mark well, could already preëxist in the fertilized ovum, or could be hereditary or acquired by blastophthoria through lesions of the *gene-bearers* transmitting the characteristics of the endocrine system, we can then explain how the powerful urge of the organism to normal growth, supplied by the hormonopoietic system in its entirety, may be deficient, so that the autochthonous evolutive impulse of the whole body becomes exhausted ahead of time, and growth is arrested at a more or less early phase. In that case, since the miopragia of the endocrine system is uniform, its consequences upon the individual's somatic-psychic hypoevolution will also be uniform. But such a uniformity of generalized endocrine miopragia must be considered *a priori* as a very rare occurrence, in view of the irregularity with which the pathogenic agents act upon the various portions of the hormonic system; this accounts for the great rarity of these cases of universal uniform infantilism.

At this point let us touch briefly upon the pathogenesis of infantilism. We do not deny that this condition may be derived from a deficient primordial germ of the entire organism, from an hereditary, congenital or early acquired insufficiency of the developmental energy with which all the tissues of the body are endowed. This seems to Falta and Bauer to be the only explanation, and the endocrine changes, if they coëxist, are regarded by them simply as coördinated with the general hypoplasia, and as the effect of the same cause, which in the last analysis remains cloaked in mystery. Thus Bauer, who, side by side with an insufficiency of autochthonous development of the entire body, of germinative or hereditary origin, such as Mathes believes in, assumes also an insufficiency acquired through infections, intoxications or diseases of the brain in infancy, could not explain why all these causes, for instance, diseases of the brain, should produce only in extremely rare cases the serious syndrome of uniform universal infantilism (while cases of infantilism of cerebral, infectious and toxic origin with endocrine lesions are considerably more frequent).

Now our own assumption is that the normal bodily growth is certainly the result of the initial evolutionary spurt (which each cell receives from the very moment of fertilization) and of the coördinating stimulating influence of all the separate evolutionary spurts which the neuro-endocrine system makes from the very first months of fetal development. But since, in higher animals, owing to the ever-improving vital unity of the individual, the influence of the neuro-endocrine system has become preponderant, to the extent that it is impossible to assume a purely autonomous growth of the organism without the aid of the hormones, it is logical to suppose that causes capable of inhibiting the development of the entire organism could not but damage contemporaneously the apparatus regulating ontogenesis—and this rather more electively than any other tissue. So that, even assuming an infantilism due to primary evolutional insufficiency of the entire organism, we could not exclude the participation of a deficiency of the hormonopoietic system in such insufficiency, and hence, from the point of view of its essence, it would never be possible to draw a definite line between a *pure extraglandular general infantilism* and a *glandular infantilism.* We cannot understand why even the adherents of Tandler's theory (J. Bauer) insist upon this absolute separation of concepts, since Tandler admits that environmental influences, such as climate and nutrition, may modify the constitution of the individual and of his descendants, that is, may produce new acquired characteristics and even transmissible ones, by influencing primarily the whole endocrine system, and especially the interstitial cells of the genital glands; the whole body would be only secondarily influenced through this kind of *induction* in the endocrine system.

Now we ask, may it not be that the causes which give rise to universal uniform infantilism also act in this way? We may add that certain modern authors indirectly support the concept of the dysendocrine origin of infantilism by showing the important part played in its genesis by impoverishment in lipoids of the organism, since we know today that lipoid metabolism is very closely related to certain endocrine glands (adrenal cortex, thymus, interstitial and lutein cells, anterior lobe of the hypophysis). Thus, Peritz assumes that it is the lipoid impoverishment produced by the toxin of syphilis that causes infantilism in cases of fetal or infantile syphilis. An analogous action might be brought about through the binding of the lipoids of the body by the toxins of tuberculosis, tetanus, diphtheria, leprosy, malaria, pellagra (Borchardt), as well as by certain poisons, such as alcohol (lipoid poison), or by nutritional disturbances (for instance in Herbert's enterogenous infantilism). All things considered, we believe it is difficult to exclude *a priori* the intervention of hormonic anomalies (of which we perhaps have as yet the merest fraction of knowledge, covering only the more serious and complete anomalies) in the genesis also of uniform universal infantilism, which for the various reasons cited above, we shall continue to regard as a single variety—and that the most rare be it cryptogenetic or not, of infantilism, and not as the only true infantilism.

We desire to say a few words regarding that anomaly of the general constitution which goes under the name of *dwarfism*, but which might better be called *microsomia.*

There is a rather rare form of this dwarfism characterized by extreme deficiency in stature (under 105 cm. for Europeans, according to Bollinger), while the physical proportions and the psychic development are regular; the *nanosomia primordialis* of Hansemann, the *heredo-familial essential microsomia* of E. Lévi, and the *pygmeism* of French authors. These subjects are small from birth, but their morphological differentiation and the puberal crisis are accomplished regularly. They can reproduce; in fact the syndrome is decidedly hereditary and familial. It is more common in the male sex and is transmitted by the father (E. Lévi). In this case the constitutional anomaly must be regarded as an extreme variant of the bodily mass, in comparison with the average type of the race.

In certain peoples pygmeism is in fact physiological (African Negrillos and Negritos, Akkas, Bushmen, etc.). This extreme variant must not on this account be regarded as without detriment to the health, but must rather be looked upon as a constitutional inferiority.

Then there is another type of microsomia, the so-called *nanism of Paltauf*, which is characterized by serious hypogenesis of the skeleton except for a very large skull with which a normal development of brain and intelligence may be associated, while the face, owing to the saddle nose, takes on a cretinoid aspect. The genitals also may be sufficiently developed, so that these dwarfs can procreate others of this same type. We are evidently concerned here with a partial hypoevolutism, which affects especially the skeletal growth. It is generally assumed that this is of dysglandular origin, and this is of great interest, in view of the fact that this nanism of Paltauf's is connected on the one side with Hansemann's primordial nanosomia and on the other with the various infantilistic nanisms of endocrine origin, which assume different clinical forms according to the glands principally attacked by dysfunction.

In these infantilistic dwarfisms we are naturally dealing with infantilisms in which a serious defect in stature and in the total bodily mass is the outstanding feature. Owing to this predominance of mass hypoevolutism they form a group by themselves, distinct from other glandular infantilisms in which bodily mass and proportions seem more evenly retarded in development. We do not fully understand the reason why in some cases the syndrome of infantilistic dwarfism and in others that of true infantilism develops in states of dyshormonism. Some light may be thrown on this question by our own concept, that one group of hormones may be particularly predisposed to stimulate the organism's ponderal growth (thymus, adrenal cortex, pancreas, anterior lobe of the hypophysis, etc.) and another to stimulate the growth of the proportions, and that in certain cases the first group is harder hit than the second.

The so-called *progeria* of Gilford or the *senile nanism* of Variot and Pironneau—a particular form of dwarfism in which there are symptoms of infantilism and at the same time premature senility—must also be an instance of hormonic alterations that especially involve certain groups of hormones rather than others. Here, along with dwarfism and the infantile proportions of the skeleton, there are found serious cachexia, complete absence of hair, senile face, a long aquiline nose, hypoplastic jaw, thin and wrinkled skin, and absence of secondary sexual characteristics, while the development of the genitals, of the muscles and of the intelligence is fairly good. The ends of the long bones are thickened, and changes have been observed in the thymus, hypophysis and adrenals, and also vascular sclerosis and multiple visceral scleroses.[1]

Coming now to *gigantism* or *megalosomia*, that anomaly of the general constitution which is characterized by a stature greatly above the average (according to Bollinger, over 205 cm. in Europeans) and by a corresponding excess of bodily mass, we must here too (as in dwarfism) point out the extreme rarity of a *well-proportioned gigantism* (*eurhythmic*), with normal development of the sexual characteristics (*gigantosomia primordialis* of Berlinger). This syndrome is due, according to some authors, to an excessive idiopathic energy in the development of the entire organism, whose cause is unknown, but, according to others (Falta), it is due to a hyperplasia and an hereditary or congenital hyperfunction of the entire endocrine system. In the great majority of cases, however, gigantism is clearly due to anomalies of the endocrine system, and particularly to hyperfunction of the anterior lobe of the hypophysis during the growth period of the individual. This hyperpituitarism may be primary or it may be secondary to a genital hypofunction (eunuchoid gigantism) and be coördinated with other endocrine anomalies (hyperthyroidism, hyperadrenalism, hypopinealism).

There is a form of *eunuchoid small gigantism* of special clinical interest, on account of its predisposition to tuberculosis, which is observed in adolescents, who, in the period preceding the puberal crisis, grow excessively in height, especially in the lower extremities (eunuchoid proportions), while at the same time they show a hypogenesis of the secondary sexual characteristics. The feminine distribution of hair on the pubes is particularly observed, along with a certain degree of gynecomastia. The hands and feet of these subjects are sometimes small and feminine, but again they may be excessively large and acromegaloid. This puberal eunuchoid small gigantism may correct itself in later years; its genesis lies equally in a hyperpituitary-hypogenital alteration. Traces of such an anomaly of growth are often found in the phthisic or dolichomorphic constitution, particularly in the variety which we have individualized as hypogenital.

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[1] For the sake of brevity we will pass over other forms of dwarfism which constitute localized anomalies or diseases of the skeletal development, such as achondroplastic and rachitic dwarfism.

There is still another form of gigantism, different from those already described, which occurs in children and is characterized by premature, rapid and exaggerated development of the entire organism, including the sexual apparatus. This syndrome, which Pellizzi appropriately calls *precocious macro-genitosomia,* is caused by tumors of the adrenal cortex or of the pineal gland, or by primary tumors of the testicle, sometimes also by dyspituitarism; some of my observations show that it may even be found in those female children (I have not been able to establish the equivalent in males) who suffer from constitutional hypothyroidism and premature but dissociated ovarian activity.

Stature and bodily mass may in these cases reach the dimensions of the adult in a few years. There are frequently dissociations and partial hypoevolutisms of the sexual characteristics, also adiposity and a certain degree of imbecility.

PART II.

LOCALIZED CONSTITUTIONAL ANOMALIES AND INADEQUACIES.

INTRODUCTION.

Necessity for analysis of local ectypes—Disease general, its manifestations always local—Why syndromes of the same general disease may differ in different individuals — Remarkable examples — Constitutional anomalies affecting given tissues—New classification not far distant.

After the study of the most important general ectypes of constitution, each one of which embraces, as has been shown, the most varied local ectypes of organs and apparatus, a rapid analysis of these local ectypes is necessary, since in the practice of medicine it is the *condition* of the separate parts of the body, depending, as we know, upon both the *autochthonous* and the *correlative* properties of the parts themselves, that in the last analysis determines the tendencies, the dispositions, the manifestations (physiological as well as pathological) which are related to any given part. By this we mean that the affections, that is to say, the manifestations, are always of a local character, although the disease itself is always general and involves the entire organic constitution.

The study of localized constitutional anomalies and inadequacies,[1] or at least of those that appear to be localized, enables us furthermore to understand why in different individuals the same general disease manifests itself by different pictures, by *syndromes* that vary in localization and symptoms; why in some subjects certain pathogenic agents favor certain organs or systems which in other subjects are hardly ever involved even by other disease agents, and why at one time a single organ, at another a whole system, and at still another the entire organism, becomes the prey of the same factor of disease!

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[1] The term *constitutional inadequacy* was used by G. H. Hyslop in 1924 to indicate "a state of bodily and mental make-up which handicaps the individual in his adjustment to the various environmental stresses." Unaware of this paper by Hyslop, we have used this same terminology instead of *constitutional weakness*, the literal equivalent of the Italian title *Le Debolezze di Costituzione*, because constitutional inadequacy corresponds to the author's point of view.—S. N.

The importance of localized constitutional dispositions to disease is shown by certain remarkable examples of diseases of predominantly exogenous origin, such as lobar pneumonia, which may kill at the same age, sometimes even on the same day of life, two individuals whose environmental conditions are quite different but whose *local pulmonary constitutions* are identical, such as may exist in two uniovular twins (case of V. Szontagh).

Bauer divides local constitutional inadequacies into four categories: (1) those rather rare ones that affect only one-half of the body; (2) those that affect the derivatives of one germinative layer, or one given tissue; (3) those that affect separate organic systems or parts of an organ; (4) those that affect given functions, either singly or in groups.

Y. Paulsen, H. Benedikt and H. Anders have published examples of the first category, and such cases are not wanting in clinical experience. Benedikt's case refers to a man with an enormous vascular mole on the right arm and another on the right side of the thorax, who showed a late postdiphtheric paralysis of the entire upper right extremity. His mother had a small fleshy rudiment in place of the pavilion of the right ear, and also suffered with paralysis of the right facial nerve; she had poor vision in the right eye and had a similar large mole on her arm and another one on the right side of the thorax. Following spina bifida, a brother had developed a deformed right foot, and the grandmother had a facial asymmetry due to hypotonia of the right facial nerve. We also know of the existence of cases of familial cerebral hemorrhage or familial renal lithiasis on the same side, and of testicular hypogenesis on the same side (Bartolotti) and so on.

In connection with anomalies which concern all or nearly all the derivatives of one germinative layer we may recall, as an example of congenital affections of the entire ectoderm, multiple neurofibromatosis and disseminated tuberous sclerosis, which consists of proliferation of the neuro-epithelial and undifferentiated primitive cells from which the nervous system originates. This proliferation may take place either simultaneously or successively, predominating now in the central nervous system, now in the cerebrospinal nerves or now in the sympathetic. The malformation may, again, involve also the other derivative of the ectoderm, the skin (multiple pigmented moles, sebaceous adenoma), and different manifestations may be observed in one and the same family, as in Schuster's case. Another group of anomalies localized in the ectoderm is produced by coincident defective development of the sebaceous and sweat glands, the hair, the teeth and the psyche. Bauer has also shown the mesodermic endogenous substratum of a syndrome individualized by Still and Chauffard, consisting of a chronic progressive polyserositis, which in some cases affects the articular sheaths, in others the tendinous sheaths and the serous bursæ, and is accompanied by enlargement of the spleen and lymphatic glands.

We have already pointed out elsewhere that lymphatism and exudative diathesis are today attributed to a constitutional inadequacy of the mesenchyma. To the same endogenous condition is referred *osteogenesis imperfecta* or *idiopathic osteopsathyrosis*, a systemic affection in which there are changes in the osseous cells, the cartilage cells, the fibroblasts and the odontoblasts all at once.

Examples of constitutional anomalies of a given tissue are furnished by cases of systemic affections of predominantly endogenous origin, which may affect the entire muscular system (progressive myopathies), the nervous tissue (diffuse gliosis, general neurinomatosis, etc.), the lymphatic tissue (status thymico-lymphaticus, lymphatic leukemia and pseudo-leukemia, lympho-granulomatosis), the adipose tissue (multiple lipomatosis), the fibroplastic tissues (multiple fibromatosis) and the hematopoietic tissues (pernicious anemia, hemolytic icterus, essential thrombophilia and thrombopenia, constitutional eosinophilia), all the mesothelial tissues of the serous membranes (Still's syndrome, multiple hygromatosis and chronic multiple serositis), or the reticulo-endothelial tissue of Aschoff, which is disseminated in the liver, spleen and lymphatic glands (Gaucher's splenomegaly) and so on.

There is a tendency today also to find a connection between hereditary and familial dispositions to tumors, sometimes to multiple tumors in the same individual and even in the same organ, and a constitutional anomaly *sui generis* of the connective tissue—more precisely, according to Neudorfer, a functional inadequacy of the reticulo-endothelial tissue. According to Rossle, strangulation of the cellular elements of the surfaces of the organs and "illegal cellular connections" readily occur during the embryonal development of the organs because of abnormal and luxuriant proliferation of the connective tissue. At an advanced age, as the result of atrophying processes of the other surrounding tissues, the liberated heterotopic elements may begin to proliferate in a disorderly way and thus generate tumors.

Perhaps the day is not far distant in which the clinic of the constitutional school will be able to group to advantage all morbid processes under three great categories—mesenchymous, parenchymous and mixed mesenchymous-parenchymous processes.

Coming to constitutional inadequacies of individual organs or apparatus, we shall, for the sake of brevity, confine ourselves to a very rapid analysis and enumeration of the more outstanding facts that have been established by the constitutional pathology of the various organic systems.

CHAPTER I.

CONSTITUTIONAL ANOMALIES AND INADEQUACIES OF THE SKIN AND CUTANEOUS APPENDAGES.

Functions of the skin—Constitutional endocrinosympathetic imbalance—Pigmentation—Rutilism—Albinism—Premature aging—Characteristics of lymphatic skin—Tendency to periodic autoinfections—Reactivity to actinic rays—Individual differences in secretory activity—Hyperidrosis—Hair and nails—Constitutional variants of subcutaneous tissue—Adiposity.

TODAY we assign great physiological importance to the skin, not merely as an apparatus for covering and mechanically protecting the organism from its surrounding environment, nor merely as the location of certain secondary sexual characteristics and as a source of sexual attraction, but also as an apparatus connected in the highest degree with the functions of trophic regulation, in intimate physiological correlation with all other parts of the body, and capable, through the nervous and humoral pathways, of influencing the life of these parts and of reacting in its turn to the slightest changes that take place in them.

Suffice it to recall the function of elaborating pigments and lipoprotein combinations that has been assigned to the Malpighian mucous layer, which is regarded almost as a true endocrine gland extending over the entire surface of the body, acting vicariously and in synergy with the adrenal glands, the kidneys and liver; the antitoxic function which this same Malpighian epithelium exercises against noxious products and virus, whether circulating in the blood stream or penetrating from without; the fixing action (like that of chlorophyl in plants) of the pigment of the basal cells of the epidermis upon the energy of the sun's rays, which is later conducted into the body metabolism; the function of contributing (according to Audrain) to the formation of lymph; that of regulating loss of bodily heat by means of the secretion of sweat and by imperceptible perspiration, and, finally, the function of gathering, by means of innumerable sensitive organs, an infinitude of impressions of the environment, which, together with the centripetal stimuli originating within the skin itself through the life of its elements, are transmitted to the common sensorium by way of the cerebrospinal and sympathetic nerves, thus playing a fundamental part in the formation of consciousness and cenesthesia. Exogenous stimuli act also as catalytic excitations, by regulating in a reflex way the rate of the basal metabolism.

Vollmer has demonstrated that 0.1 cc. physiological solution is enough to diminish the acidity of the urine in one-half hour, especially if it is administered in the afternoon; that is, it is enough to produce an alkalosis of the blood, probably because of the reflex stimulation of the parasympathetic center, since the effect is inhibited by atropine and increased by pilocarpine. Intracutaneous injection of potassium and phosphate ions acts in the same way as physiological solution, while calcium increases the acidity of the urine (sympathicotonia increased in a reflex way).

Furthermore, intracutaneous injections of atropine and novocaine in isotonic solution are followed in fifteen minutes by hyperglycemia. According to E. F. Müller, after intracutaneous injection of aolan leukopenia appears as a probable sign of vagal stimulation.

We thus understand the enormous diagnostic and pathogenetic value assigned in constitutional pathology to endogenous anomalies of the skin and cutaneous appendages. We may well say that the skin is like the individual's *visiting card*, serving as an index of his humoral state and nutritive balance.

The skin may be thin and delicate, owing to hypoevolutism, as is shown in lymphatic subjects and in many microsplanchnic and megalosplanchnic subjects of lymphatic type, as also of hypopituitary, hypogenital and hypoadrenal type. It is a well-known fact that the period at which the function of the hypophysis, the adrenals and the sex glands (from puberty on) begins to be active, and at which the thymus and lymphatic tissue regress, is the very period at which the skin and cutaneous appendages become strong and lose their infantile or puerile character. It is possible, then, for the skin in the adult male to be as delicate as that of the female. This is shown especially in hypopituitary and hyperthymic subjects, in eunuchoids and in many of Stiler's asthenics of hypoplastic constitution. We find, on the contrary, a greater thickness and strength of skin in constitutional hypothyroidism, anterior hyperpituitarism and hypergenitalism, and in women with masculine characteristics. As a rule, cutaneous hypoevolutism is accompanied by a deficiency of pigment, on account of which, and also because of the thinness of the skin, these individuals show great transparency of the venous network of the derma and subcutaneous tissue, and have light blond hair. On account of the scarcity of pigment this skin with *insufficient pigmentary function* reacts to the sun's rays with reddening, desquamation and the formation of chloasmas and freckles, rather than with a greater production of pigment, as occurs in richly pigmented skins. We know that freckles, which may also be produced independently of the action of light, even on covered parts of the body, cannot be strictly differentiated from those small reddish-brown congenital discolorations, true pigmentary moles, known as lentigines. Both have a predilection for the skin of blond and red-haired persons, and are important stigmata of status degenerativus, for which reason they are frequently found in pulmonary tuberculosis, as also in nephritis and appendicitis (Adler, E. Stern), and generally in hyposympathicotonic individuals.

In women, in men of dysgenital constitution and frequently in insane persons (Lombroso and Golgi, Volpi) we may readily observe the presence of chloasmas, of yellowish-brown spots on the cheeks, on the sides of the forehead, the nose, upper lip and in some cases the backs of the hands. In subjects predisposed to gall stones we also frequently see the brown patches known as *liver spots*, scattered sometimes all over the body.

Other degenerative pigmentary stigmata are *Mongolian spots*, almost normal in peoples of the yellow race, but found in Europeans chiefly in Mongolian idiots, where they bear witness to an admixture of Mongolian blood.

Individuals with strongly pigmented skin—sometimes with brown stains even on the mucosa of the mouth and with numerous pigmentary moles—which reacts by deep tanning of the zone exposed to external irritation (applications of blisters, burning, solar rays, scars) not infrequently show signs of constitutional endocrino-sympathetic imbalance (hypoadrenalism, hyperthyroidism, hypotonia of the pigmento-inhibitory sympathetic nerves, and, according to Eppinger and Hess, parasympathicotonia). This accounts for their predisposition to Addison's and Basedow's diseases, and their lack of predisposition to florid pulmonary tuberculosis (Jesionek) and rheumatic endocarditis (Y. Paulsen).

In order to test the capacity of the skin for producing pigment there has recently been introduced into clinical use the so-called dopa reaction of v. Grör and his collaborators. Bloch had formerly identified the mother substance of the epidermic pigment with an achromatic amino-acid, which he called *dopa*. This, by means of an oxydase contained only in the Malpighian cells, becomes the melanine of these cells. Now v. Grör and his pupils, after cutting off about 5 square centimeters of skin with a very thin blade in order to avoid any bleeding and to remove only the epidermis as far as the basal cells, place this fragment of skin over a sterilized cork moistened with a 2 per cent solution of *dopa* and wrap it with some Billroth plaster. After eight hours they observe the brown color that appears both on the basal stratum of the skin and on the cork. The intensity of the color may be measured with a colorimeter or with a test solution of dopa.

An increase in the amount of the amino-acids which can be oxidized in melanine by the epidermic cells occurs during exaggerated protein metabolism, fasting, pregnancy and in tuberculosis—hence the hyperpigmentation that is common to all these processes. The regions that are only slightly pigmented react weakly to all pharmacodynamic influences—for instance, to the diphtheria toxin in Schick's reaction.

As is well known, the blond type, especially the red-haired (and particularly if the *rutilism* or *flavism* is partial, and limited to one hairy region), shows a marked predisposition to tuberculosis in populations where the brunette type predominates, while in populations where the blond-haired type predominates (Sweden, for example) it is the brunette type that has this greater predisposition. Rutilism is always a serious degenerative stigma, and as such is often found in neuro-psychopathics as well as in persons predisposed to tuberculosis. Vitiligo, often of symmetric or metameric distribution, is also frequently associated with the neuro-psychopathic predisposition. I have very often observed vitiligo in bunches of hair in subjects with signs of constitutional hyperthyroidism or dysthyroidism. Similarly in *albinism* we find a tendency to neuropsychopathy, eczema, acne, telangiectases and melanotic tumors. It is not very unusual to see in candidates for pulmonary tuberculosis a large crop of vascular moles on the nape at the border of the hair implantation (Zak), or of telangiectases in the suprascapulary and interscapulary regions (Franke's vascular striæ). Constitutional inadequacy of the skin, true cutaneous abiotrophy, is revealed also in premature aging, inelasticity, dryness, wrinkling, especially on the forehead and in the peri-orbital regions, and by parchment coloring (senile skin or geroderma)—phenomena which are found in hypothyroid, hypopituitary and hypogenital constitutions, and also in persons who have engaged in sexual overindulgence. To this same process of premature aging belongs also the premature whitening of the hair, which is met quite frequently in thyroid instability or in paradoxical partial hyperthyroidism (hypoparathyroidism?) and is characteristic of the arthritic diathesis (L. Lévi).

It is interesting to note that along with this premature whitening of the hair these subjects have thick hair and black eyebrows, even at an advanced age, and the skin of the face may show characteristics of persistent youthfulness (*juvenile senilism*). *Persistent juvenility* of the skin is characteristic of hyperthyroid constitutions and is for this reason frequent in the microsplanchnic constitution of hyperthyroid or hyperpituitary type. We sometimes observe in aged persons a contrast between the aging of the skin of the face, thorax and upper extremities and the freshness of the skin of the abdomen and thighs. In a case of this type the pubic hair also may be pigmented and thick. Here we are probably dealing with hypergenital subjects. It is also interesting to note the premature atrophy of the elastic tissue of the skin as it appears in the so-called *striæ gravidicæ*, which may be found not only in pregnancy but also in dysgenital subjects and those of puberal age (Nardelli).

We already know the characteristics of the lymphatic skin, of the skin in exudative diathesis, in arthritism of infants and adults, and its *eczematous reactivity*, its abnormal vasosecretory, angioneurotic and inflammatory reaction to the most varied cutaneous stimuli of exogenous origin (traumatic, physical, chemical stimuli; proteins introduced through the alimentary canal or parenterally), or of endogenous origin (metabolic poisons), its idiosyncrasy toward certain chemical substances ingested or applied externally (iodine and iodoform, carbolic acid, bichloride of mercury, various salts, etc.).

Intimately related to this abnormal reactivity of the skin in exudative diathesis and arthritism is the tendency of the skin of certain subjects to chronic or periodic autoinfections (acne, furunculosis, recurrent erysipelas). We observe this in dysthyroid and dysgenital constitutions (chlorosis), and, according to Blocq, also in constitutional endocrine insufficiency of the pancreas (prediabetic states). Poor resistance of the skin to noxious agents in general is also revealed by a ready liability to pediculosis in infants and also in adults of hypothyroid constitution.

We may also mention the special reactivity of the skin to the actinic rays of sunlight, which is at the bottom of the so-called familial *xeroderma pigmentosum* and *hydroa æstivalis.* In this last case the photo-chemical sensitization might be produced by a state of hemato-porphyrinemia, as a manifestation of anomalous metabolism. A constitutional predisposition may also reveal itself in *hyperkeratosis,* especially in ichthyosis and other forms of keratosis that are generally familial and hereditary, as also in ordinary corns, which are known to favor certain subjects and to spare others.

Marked individual differences are found in the secretory activity of the skin. The relation between the sebaceous secretion and the genital endocrine function is clearly demonstrated today, the latter having a stimulating and excito-secretory action upon the sebaceous glands. According to Sabouraud, seborrhea, especially that of the head which leads to baldness, is found in subjects who are genitally hyperactive. Eunuchs, as Hippocrates already knew, never become bald. The infrequency of baldness in women is probably due to more energetic function of the thyroid, which activates the trophism of the scalp and hair and, in my opinion, inhibits the sebaceous secretion. In fact, according to L. Lévi, baldness is not rare in dysthyroid women. It is not unlikely that in the sexually hyperactive man, especially if this hyperactivity is of arthritic origin (a thyroid instability exists in arthritism), the excess of testicular function causes an insufficient protective action of the thyroid on the scalp and an insufficient inhibition of the sebaceous secretion. It would be interesting to study the relations between this secretion and cholesterinemia, which is so closely connected with certain endocrine tissues (genital glands, adrenal cortex).

According to Bauer, the constitutional anomalies of perspiration do not present a parallel behavior to this, but often act antithetically. Hyperidrosis is often a stigma of constitutional hyperthyroidism and hyperpituitarism, while hypoidrosis is found in hypothyroid, hypopituitary and hypogenital subjects. In certain sterile women Morgagni even found anidrosis. Hyperidrosis of the hands and feet is also frequent in the microsplanchnic habitus; this is accompanied by warm and highly colored hands (active vasodilatation) in hyperthyroid and hyperpituitary microsplanchnics. On the contrary, in subjects of hypopituitary, hypoadrenal, hypoparathyroid, hypogenital type (the vagotonics of Eppinger and Hess) it is accompanied by acrohypothermy and acrocyanosis. There also exists an hereditary and familial syndrome, in which there are combined defects in development of the sudoriferous and sebaceous glands, the hair, the teeth (Standberg), and a mental deficiency. In these subjects with ectodermic anomalies there is a compensatory polypnea which serves to supply the insufficient regulation of the thermic irradiation of the skin.

With regard to the behavior of the hair and nails, we may say that it is a sign of hypoevolutism, of organic immaturity, when there are anomalous persistence and accentuation, during the post-puberal age, of fetal down, which, as is well known, is replaced normally at puberty by *terminal hair* (in the male, on the face, the pubes, the linea alba, the perineum, the axillæ, the upper and lower extremities and the thorax; in the female, on the pubes and in the axillæ). We find this *hypertrichosis lanuginea* in lymphatic infantile individuals, in asthenics and hypoplastic microsplanchnics, predisposed to tuberculosis; in schizophrenics (Kretschmer), in female children with utero-ovarian hypoplasia, who are chlorotic, lymphatic, amenorrheic or dysmenorrheic. To this primary hypertrichosis there corresponds a secondary or terminal hypotrichosis, which results, in the male, in a scanty development of beard, mustache and hair on the thorax, extremities and trunk.

In females with hypertrichosis lanuginea we observe a luxuriant growth of down even on the chin and preauricular regions, on the legs and forearm, that is, in the regions where, in the male, there develop the definitive hairs that are characteristic of his sex. This down may be replaced later on (at maturity or menopause, for instance) by hard, lasting hairs of masculine type, either isolated or so abundant as to form a real beard and mustache (the so-called *old woman's beard*). This is especially true of women of hypo-ovarian, hyperthyroid, hyperpituitary or hyperadrenal constitution, who also show in some cases a certain hypertrichogenesis lanuginea of a transitory form during pregnancy or in the premenstrual period. In these same women we may observe also, from puberty on, a more diffuse terminal hypertrichosis of masculine type; that is to say, instead of the definitive hairs being limited to the axillæ and pubes (and bordered here by a horizontal line), they grow profusely on the subumbilical line, joining the hairs of the pubes below, as in the male. Hair is also observed in the intermammary spaces and around the mammary areolæ,[1] on the extremities, especially the legs, and even in the perianal region, besides being found on the face. Eppinger and Hess find that coarse, long, single hairs are quite frequent in the intermammary space and on the areolæ as well as on the linea alba in women of vagotonic constitution. In these cases the hair of the pubes and axillæ sometimes has a tendency to form tufts or a mane. In the male a terminal hypertrichosis, especially of the thorax and beard, is a stigma rather of hyperorchidism, while a diffuse hypertrichosis of the whole body may depend upon a hyperthyroid, hyperpituitary and hyperadrenal constitution, and may be found even in microsplanchnics in whom the genital function is not very much developed.

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[1] Whenever this anomaly of trichogenesis has been found in women I have also found almost invariably menstrual anomalies, such as dysmenorrhea, oligomenorrhea or amenorrhea.

The hair of the scalp, as well as that of the eyebrows and eyelashes, is subject to different trophic impulses from those that control the hair of the other regions of the body. This explains why in men of hypergenital or hyperadrenal and hyperpituitary constitution we find an exaggerated terminal hypertrichosis on the trunk and extremities, while the hair of the head and that of the eyebrows and eyelashes is scanty and apt to fall. Conversely, in hypogenitals, in lymphatic hyperthyroids and in Stiler's asthenics we often find magnificent heads of hair, thick eyebrows, sometimes united over the roots of the nose by scattered hairs, and long eyelashes.

Very often the hair is also curly in these cases, especially when the hyperthyroid temperament dominates. My experience of many years enables me to state that curly heads are often found to be associated with serious neuropathic diathesis. On the other hand, smooth, soft, delicate, fur-like hair is frequent in subjects who are tainted with hypothyroidism, hypopituitarism or hyperthymism. We know the frequency with which the eyebrows meet (synophrys) in criminals and degenerates, and the frequency of hypotrichosis of the external third of the eyebrow (L. Lévi's sign) in hypothyroids and dysthyroids. We may also point out the bristly character of the beard and, in some cases, even of the hair in certain constitutions, such as eunuchoid hyperpituitaries, in whom we also find a tower-like skull.

As a rule, the nails in the various constitutions behave like the hair. In hypoplastic constitutions we find fragile, thin nails of infantile type, subject to striæ and white spots, atrophic and slow of growth, while in hyperthyroids and hyperpituitaries there are well-developed, shiny nails, that grow rapidly. It is characteristic of the hypopituitary constitution that the lunula of the nail is frequently absent or very small. In certain endocrinopathics, notably in hypogenitals, I have even seen nails like the crystal of a watch.

Mention should be made of the constitutional variants of the subcutaneous tissue. There is extremely little fat in hyperthyroid and hyperpituitary constitutions, and this is also true of the hypogenital constitutions of both sexes, as well as of the hypoplastic asthenic type of individual with stigmata of hypoadrenalism. In certain cases it is chiefly the face, upper extremities and thorax that are thin, while the subject may have rather a plentiful layer of fat on the abdomen, hips and thighs. In these cases I have found stigmata of hyperthyroidism. We find the same adipogenetic disharmony, in an exaggerated pathological form, in the so-called progressive lipodystrophy of Barraquer.

The reverse case is also observed, where a man with thin lower extremities has a good supply of fat on the neck, thorax, upper extremities and abdomen. This is not infrequent in male megalosplanchnics at the climacteric age, and in cases of testicular deficiency. In certain women too we may observe a superabundance of fat almost exclusively on the chest, back and shoulders, while the abdomen, hips and lower extremities have relatively little fat on them. In other women the contrary is observed—the face, chest and upper extremities are rather thin, while fat abounds on the lower part of the abdomen, the hips and thighs. In the first case the trunk has the form of a trapezoid with the base turned upward; in the second, that of a trapezoid with the base turned downward along the bitrochanteric line. It seems as though the adipogenesis of the upper half of the body is subject to different neuro-hormonic impulses (thyroid and pituitary gland) which are somehow antagonistic to those that stimulate the adipogenesis of the lower half (ovary, pancreas, liver).

A well-known characteristic of megalosplanchnics, especially those in whom constitutional hypothyroidism predominates, is that form of adiposity localized for the most part in the regions of the mandibular angles, under the chin, in the supraclavicular fossæ, and sometimes in the groins, in the form of pseudo-lipomata, whereas if hypopituitarism or hypogenitalism predominates, the adipose tissue has a predilection for the breasts, the suprapubic and prepubic regions, the hips and sometimes the upper eyelids and the backs of the hands and feet. In women of dysgenital constitution, especially at the critical age, there is frequently, according to my observations, a special accumulation of hard, generalized fat on the lower part of the legs and around the malleoli, with a subsequent deformation of the line of the ankle.

CHAPTER II.

CONSTITUTIONAL INADEQUACIES OF THE SKELETO-MUSCULAR SYSTEM.

Value of constitutional anomalies of the skeleton as an index of general constitutional anomaly—Hands and feet of certain endocrine types—Anomalies of the head—Brittleness of bones in hypoevolute types—Anomalies of the spine—Teeth—Muscular deficiencies—Spasmophilia—Muscular asthenia in premature involution of the pineal gland—Modifications of muscular tonus.

Constitutional anomalies of the skeleton, especially in the distal parts of the body (heads, hands, feet) and also those of the teeth, are of extraordinary value as an index of general constitutional anomaly, owing to their ease of approach now that we have the help of the roentgen-rays. From this point of view, which is of greater interest to us than the various anomalies and hereditary malformations of more localized character, we must recall the extreme slenderness of the long bones in hypogenital, hyperthymic, hyperthyroid and hypopituitary individuals, in whom the apophyses and epiphyses of the bones protrude very little, whereas in hypothymism and hypothyroidism the bones are heavy, with somewhat deformed epiphyses and deficient calcification. In anterior hyperpituitarism and in constitutional hypergenitalism the long bones are robust, with very pronounced tuberosities and apophyses, and in some cases with exostoses near the articular ends.

The form of the hands, feet and head is very important. We find in hypopituitary constitutions small but well-proportioned hands and feet (acromicria), often with the extremities of the phalanges pointed, sometimes of puerile and rather plump type; in hypogenital, hyperthymic and hyperthyroid constitutions, long, thin hands, sometimes bony; in hypothyroid constitutions, small, short hands, relatively broad and fat; in anterior hyperpituitarism, large, rather thick, long hands with massive fingers, broad at the ends; in the combined hypopituitarism and hypothyroidism of adolescents, small, conical hands with broad palms, with fingers narrow and pointed, often with a cold, livid, adipose cushion over the entire dorsum of the hand. Another characteristic finding is the hyperextensibility of the articulations of the hands and fingers in hypopituitary, hypogenital, hyperthymic and mongoloid constitutions. In very prolific hypergenital women I have frequently observed a thick hand with short fingers almost of hypochondroplastic type.

We may also draw attention to the presence of flatfoot and a broad instep as a symptom of hypoevolutism in infantile and asthenic-hypoplastic constitutions, while high-arched feet with slender ankles are characteristic of dolichomorphic hyperevolute constitutions (hyperthyroid). It is interesting at this point to observe how thoroughly the type of beauty of hands and feet sought by modern artists corresponds to the hyperthyroid type.

As regards the head, we already know the particulars of the skull and face in the two human types, the microsplanchnic and megalosplanchnic. We may note in addition the special *conch form* of the occiput in Rummo's and Ferrannini's eunuchoids; the high and pointed *tower skull* in certain eunuchoids of hyperpituitary type, who also, according to Kretschmer, have a characteristic bristly, brush-like beard; the exaggerated size of all the bony cavities of the skull and face in hyperpituitary constitutions; also the massive mandible, with wide spaces between the teeth, in constitutional anterior hyperpituitarism; conversely, the small, narrow mandible with insufficient interdental spaces, which encourages superposition of the teeth, in hypopituitary constitutions; the deficient development in length of the base of the skull in hypothyroidism and hypochondroplasia, resulting in the sinking in of the roots of the nose and in eyes placed too near together; conversely, the roots of the nose broad and the eyes too far apart in hypopituitary, adenoid, mongoloid and eunuchoid constitutions; the high narrow-arched palate of the adenoid and vagotonic types of Eppinger and Hess; the short, small, trilobate or puerile form of nose found in hypoendocrinism in general; the long, delicate nose of hyperthyroidism; the long, large and fleshy nose of hyperpituitarism; the long ears of certain hypogenital and hyperpituitary constitutions; the short, broad, fan-shaped, ape-like ears of many hypothyroid infantile types and of the gerodermatics of Rummo and Ferrannini; the low, round orbits set horizontally like the pans of a balance in hypoplastic and hypoendocrine constitutions; the high, broad orbits with strongly arched upper margins in hyperendocrine constitutions.

Finally, with regard to the skeleton we may point out the brittleness of the bones and the tendency to fractures in hypothyroid, hypothymic and hypopituitary constitutions, which also show in infancy a tendency to rachitic changes; while a tendency in women to osteomalacia is attributable to hypoparathyroidism combined with hypoövarism and constitutional hyperthyroidism. And we may note *genu valgum*, in adolescent man, as a stigma of hypopituitarism combined with hypoörchidism or hyperthymism.

In certain complex dysglandular temperaments, notably in microsplanchnics with excessively dolichomorphic trunks, in whom the spinal column grows rapidly in height and in whom there are stigmata of hyperthyroidism and puberal hyperpituitarism, we often observe either a kyphosis—mostly cervico-thoracic, and possibly transitory—or a thoracic scoliosis or a lumbar lordosis. In other cases, on the contrary, I have seen the so-called *essential scoliosis of adolescents* associated with hypothyroidism and hypoövarism. And the hypothesis is not overaudacious that a special endocrine soil favors that change of the last lumbar vertebra known as *sacralization* or Bertolotti's syndrome. I have observed in two women of hypogenital-hypothyroid constitution a symmetrical painless enlargement of the superior and inferior epiphyses of the interphalangeal articulations of both hands (a species of rosary finger). This condition has nothing to do with arthritis deformans, is not acquired and is definitely hereditary. Great relaxation of the articular ligaments and hyperextensibility of the articulations are characteristic of hypopituitary temperaments, while premature aging of the cartilages and articular membranes marks hypothyroid constitution.

Studying the teeth, we find in hyperthyroid or hyperthyroid-hyperpituitary constitutions a regular and strong conformation with no tendency to caries, accumulation of tartar or process of expulsive alveolitis; dentition occurs rather early, and, more characteristic still, is the premature and regular appearance of the permanent teeth. We find in hypoparathyroid or hypothymic constitutions a hypoplasia of the enamel of the incisors; in some cases a rather premature but dissociated first dentition, with a tendency to spontaneous falling out of the teeth shortly after their eruption; or the teeth may break readily, and the second dentition be irregular and late. In constitutional hypothyroidism and hypopituitarism we find a retardation and irregularity of both the first and the second dentition, microdontia, a tendency to early caries and persistence of the milk teeth even to the age of puberty or beyond. In some instances of hypopituitarism in males we see a feminine type of dentition, in which the median upper incisors are strongly developed and the canines have the form of the incisors; in addition there is dental superposition, owing to the extreme narrowness of the alveolar margin. In hyperpituitarism the teeth are large and are widely separated, this being especially true of the middle incisors. In hypergenital temperaments, in individuals who are overindulgent sexually, we encounter early caries and ready falling out of the teeth from expulsive gingivitis. According to American authors, hypergenitalism in males produces narrow lateral incisors with a blunt edge almost like that of the canines, while large, sharp canine teeth are stigmata of the hyperadrenal temperament. The strong tendency in hypopancreatic (hyperglycemic) individuals to spontaneous falling out of the teeth is also well known.

Coming to constitutional anomalies of the muscles, we may point out the deficiency in size and trophism of the muscular system in hyperthyroid, hypogenital, hypoadrenal and hypopituitary constitutions, although there may be no constant relation between the size on the one hand and the contractile energy on the other. Thus in hyperthyroids slim muscles may be quite energetic, while in hypogenitalism, hypoadrenalism and hypopituitarism the lack of size is associated with muscular weakness. Conversely, we find powerfully developed muscles in hyperpituitary, hyperadrenal and hypergenital constitutions, as well as in thymico-lymphatics. But here too we have at times a contrast between size and muscular force. For instance, in status thymicus we know of the striking characteristic *myasthenia*, which may reach the syndrome of *Erb's myasthenia.*

It is probable that the marked muscular asthenia that we find in certain endocrine temperaments depends upon special anomalies of structure of the muscular tissue, for example upon the presence in it of lymphocytoid niduses observed in status thymico-lymphaticus and in pathological hyperthyroidism (also in hypoparathyroidism?). We know the great importance of the parathyroid glands in determining the degree of individual muscular excitability (electric, mechanical) and the extent of the tendency, or the lack of this, to hyperreflexism, spasmophilia and hypertonia; hence this excitability and this tendency must seem exaggerated in a hypoparathyroid temperament.

A tendency to muscular asthenia, atrophy and pseudo-hypertrophy has been observed in adolescents with a premature involution of the pineal gland, as well as in hypothyroid, hypothymic, hypopituitary and spasmophilic constitutions (Peritz). On the other hand, there is an exaggerated development of the skeletomuscular system (athletic habitus) in women of masculine frame with stigmata of hypoövarism coördinated with hyperpituitarism and cortical hyperadrenalism.

The modifications of the *muscular tonus*, according to the degree of functionality of the extrapyramidal and pyramidal systems, respectively, are also worthy of study. According to Levy, individuals may, solely because of their constitution, already possess a special type of static attitude either extrapyramidal and Parkinsonoid, or pyramidal, or tabetic (hypotonic and relaxed).

CHAPTER III.

CONSTITUTIONAL ANOMALIES OF THE BLOOD AND HEMOLYMPHOPOIETIC ORGANS.

Constitutional erythrocytosis — Leukocytosis — Thrombocytosis — Erythropenia—Leukopenia—Thrombopenia—Lymphocytosis-mononucleosis in hypoendocrine conditions—Significance of lymphatic reaction—Eosinophilia—Is there a constitutional neutrophilia?—Anomaly of hemohistioblasts perhaps responsible for pernicious anemia—Anomalies of the reticulo-endothelial apparatus—Icterus and hemolytic splenomegaly—Chlorosis—Constitutional hyperplasia of the lymphopoietic system.

The morphological and clinical examination of the blood gives the greatest evidence of constitutional variations localized in one tissue or system of organs and of their preponderant pathogenetic importance in the determination of one entire family of disease states. We may briefly consider the constitutional variations of the several categories of morphological elements of the blood, each of which has, as we now know, a specialized function—erythrocytes, the several varieties of leukocytes, and platelets.

There are certain individuals with a constitutional erythrocytosis, certain others with a constitutional erythropenia, as there are still others with a constitutional leukocytosis, or a thrombocytosis or a thrombopenia. We find an erythrocytosis (a red cell count of over 5,000,000 to 6,000,000 per c.mm.) independently of variations in the concentration of the blood, vasomotor variations or climatic influences, in subjects who are healthy but who carry endemic goiter, and in one entire group of conditions in which constitutional hypogenitalism is present. Again, in hypothyroid megalosplanchnics and in megalosplanchnics of the hyperadrenal and hypergenital varieties we quite often find a hyperglobulia or polycythemia, which no doubt represents an approach to the true disease condition known as *erythremia* or *polycythemia rubra*, the nature of which, when it appears in familial form, is shown to be predominantly endogenous. Here we are probably dealing with a hyperfunctional and hyperplastic tendency of the erythrocytogenous tissue of the bone-marrow, either autochthonous or secondary to excessive erythropoietic hormonic stimuli (hepatic hormones? adrenal and genital hormones?) or to a lack of inhibitory stimuli (hyposplenism, according to modern views of the inhibitory action of certain splenic hormones upon the production of red cells).

A *constitutional erythropenia* has, on the other hand, been described by Morawitz (to be distinguished from constitutional chlorosis) in women who from girlhood have a rather low red cell count and a hemoglobin value of only moderate degree but a hemoglobin index equal to 1, and who often present vascular hypoplasia and a poverty of blood in the cutaneous vessels, so that it is difficult to obtain one drop of blood upon puncturing the skin. A condition of constitutional erythroblastic torpor of the bone-marrow is believed to exist in hypoplastic anemias.

A very frequent form of leukocytosis is that which has to do with lymphocytes and monocytes or eosinophile polynuclears (in fact these two conditions are often combined).

Lymphocytosis-mononucleosis, accompanied by neutropenia, may easily be found in a long series of constitutional states as well as of endogenous diseases, and especially in hypoendocrine conditions (hypothyroidism, hypopituitarism, hypogenitalism, hypoadrenalism and hyperthymism) and in lymphatism and status thymico-lymphaticus. This is a stigma of hematic hypoevolutism, of hypoplasia or hypofunction of the granulocytogenous system (Neusser, Ortner); hence it is accompanied by the most varied manifestations of organic immaturity (cardio-vascular hypoplasia, functional albuminuria, irritable weakness of the vegetative nervous system and vagotonia, chlorosis, achylia and hypochylia, eunuchoidism, Stiler's asthenia, diabetes, spasmophilia, etc.). An *absolute lymphocytosis-mononuclecsis* has an especially great importance, more than has a *relative* (normally the absolute number of mononuclears varies as much as 2500 per c.mm.). According to Bauer and Hinteregger, in status degenerativus and in hypoplastic conditions there is a tendency for the hematopoietic system to react under the most varied conditions by returning to the infantile form of leukocytes. In fact it has been observed that certain individuals of lymphatic type react with a relative or absolute lymphocytosis-monocytosis to stimuli that are capable of provoking a polynucleosis (infections, injections of gelatin, of milk). Many authors believe that this *lymphatic reaction* may go so far as to produce a true acute lymphatic leukemia of septic origin and also a chronic lymphatic leukemia in certain subjects who have an insufficient system of granulocytic defense and in whom the leukopoietic organs are of markedly infantile type. Some authors, such as Neusser, Ritook, Herz and

Citron, have called attention to the importance of the hypoplastic constitution and status thymico-lymphaticus in creating a predisposition to lymphatic leukemia. In two cases of status lymphaticus in men aged fifty-four years Neusser saw lymphatic leukemia appear after revaccination.

Biach, for his part, has observed that in lymphatic subjects acute infections may bring about a special reaction of the meninges without meningitic symptoms, characterized by excessive lymphocytosis of the cerebrospinal fluid. Moreover the predisposition to lymphogranulomatosis is characteristic of lymphatics (Stoerk) and requires not so much a special microörganism as a special mode of reaction on the part of the lymphatic system of the subject. We also know that no absolute pathogenetic limits can be defined between simple lymphatic hyperplasia, lymphogranulomatosis and lymphosarcomatosis that may coincide in the same subject (Glanzmann, Bauer) or in the same family.

As for *constitutional eosinophilia*, or Stäubli's *eosinophile diathesis*, we know that this is often a satellite of the exudative diathesis, of arthritism, of vagotonic diathesis, of endogenous neuroses, such as hysteria, neurasthenia, schizophrenia, or of the most varied degenerative states (goiter, eunuchoidism, infantilism, hypophyseal syndromes, functional albuminuria). According to the prevailing current opinion, eosinophilia is coördinated with an exaggerated production in the organism and in the blood stream of proteins, or of products of decomposition of foreign proteins or of proteins that have become heterogenous (Schlecht), so that it would indicate a constitutional condition of autointoxication.

It is not possible on the basis of our methodical observations to assert positively that there exists a *neutrophile granulocytosis* or *constitutional neutrophilia* in the same way that there is a lymphocytosis or an eosinophilia, but the existence of such is presumable for the reason that it would constitute an antithesis to constitutional neutropenia and also because there do exist constitutions which are wholly antithetic to those that show neutropenia (dry, non-lymphatic constitutions, rich in red cells and hemoglobin, and characterized by plethora). On the other hand, we know that just as there exists a *lymphatic* infectious *reaction*, so can we in some other individuals readily find a *myeloid reaction*, secondary to sepsis and readily terminating in myeloid leukemia; so that in such individuals we may assume a constitutional tendency to hyperplasia of the granulocyte tissue.

As for platelets, a constitutional thrombocytosis was found by Siess and Stoerk in lymphatic individuals, while L. Bauer and H. Zeller found high platelet values both in healthy subjects and in individuals with stigmata of degeneration and organic immaturity. Bauer assumes that this constitutional thrombocytosis explains *thrombophilia,* the tendency to thrombi, to ready coagulation of the blood in certain subjects—*essential thrombophilia* which may also appear in a familial form. It is not improbable that a constitutional tendency to excessive formation of platelets on the part of megakaryocytes is at the bottom of certain special clinical conditions similar to leukemias, in which the blood stream contains a large number of platelets and primitive megakaryocytes (Di Guglielmo).

The opposite condition, constitutional or essential thrombopenia (Frank), has been brought out by Frank, Fonio, Stiegher, Hess, etc., as the foundation of hemorrhagic diathesis, of the delay in coagulation of the blood in certain subjects and the poor retractility of the blood clot, such as is encountered in Verloff's disease, in purpura and in hemophilia. According to Frank, thrombopenia is also characteristic of aplastic pernicious anemia, to such a point that he calls this *hemorrhagic aleukia.* Some authors also assume the existence of a functional asthenia of the blood platelets in certain individuals, since platelets may be very numerous in some cases of hemorrhagic diathesis and yet be incapable of forming a coagulating ferment (Glanzmann's *hereditary hemorrhagic thrombo-asthenia*).

It has been suggested that in some constitutions there may exist also a constitutional anomaly of the primitive mesenchymal elements which are the progenitors of the blood cells—*hemohistioblasts*--by virtue of which these are not capable in circumstances where there is need of a hemoproductive, hemoöriginating functional effort, of generating mature blood cells, but react with a fetal type of hematopoiesis, such as occurs in pernicious anemia and leukoanemia. This concept deserves consideration in order to explain the endogenous and in some cases hereditary and familial disposition of certain individuals to Biermer's anemia and to leukemias, even when pernicious anemia seems to have been provoked by a known exogenous factor. In the case of pernicious anemia from bothriocephalus, for instance, only a fraction of the persons contracting the infection fall a prey to pernicious anemia, these being subjects who are evidently constitutionally tainted in the hematopoietic organs and in certain other organs, such, for example, as the stomach, as Ossiam Schaumann has well demonstrated.

Anomalies also of the reticulo-endothelial apparatus, of the endothelium of the hematopoietic organs, which is embryologically related to the blood-making cells, explain the genesis of certain diseased states of the blood that are markedly hereditary and familial, although they seem in some cases to be acquired. Examples of such states are icterus and hemolytic splenomegaly, in which there is now a tendency to assume the existence of an excessive catatonic action of the splenic elements upon the erythrocytes (elements of the reticulum?) or an inhibitory action upon the medullary erythropoiesis. Another example is *Gaucher's splenomegaly*, in which, according to the results of Schlagenhaufer's investigations, we are confronted with a familial tendency to hyperplasia and hypersecretion of lipoids on the part of the reticular endothelium of the spleen, lymphatic glands, liver and bone-marrow. A constitutional anomaly involving particularly the metabolism of hemoglobin in the red corpuscles, and closely related to dysgenitalism, to an anomalous genital hormonic action (especially in women) upon the assimilation or disassimilation of hemoglobin on the part of the erythrocytes, is universally assumed in the genesis of chlorosis, which is so often correlated with other degenerative stigmata (hypoplasia and infantilism of the heart and arteries, lymphatism, hypogenitalism, hypoadrenalism, vagotonia, etc.).

With regard to constitutional hyperplasia of the lymphopoietic tissues, it is unnecessary to repeat what we have said on the subject of the general constitutional ectypes. But we wish to insist upon the concept that in lymphatic hyperplasia it may be necessary to distinguish a *hypersthenic* form with hyperfunction of the lymphatic elements (a function which there is a tendency today to regard as related to the organism's defenses against poisons and lipotropic microörganisms) and an *asthenic* form in which there is a functional torpor of the lymphoid organs, which easily become a prey to noxious agents and readily undergo atrophy and sclerosis, as Bartel has shown.

Equally interesting is the fact, which we have often observed, that lymphatic hyperplasia may in certain individuals affect only certain regions of the body or only one side of the body, and then in an hereditary and familial form (*heredo-familial regional lymphatic hyperplasia*). Among these localized forms of hyperplasia of hematopoietic origin belongs also Hirschfeld's *constitutional or idiopathic splenomegaly*, which may at times be found in lymphatic, exudative or infantile individuals, and which may be the link to Banti's disease, which we and other authors have not infrequently seen in children, associated with infantilism and dysendocrinism.

CHAPTER IV.

CONSTITUTIONAL ANOMALIES AND INADEQUACIES OF THE CIRCULATORY APPARATUS.

Cardio-vascular hypoevolutism—Cardiac infantilism—Instability of cardiac action—Drop-heart—The hypoplastic aorta—Hemorrhagic diathesis—Arteriosclerosis a constitutional inadequacy of arterial walls—Constitutional miopragia of the intima—Hypertonic diathesis—Angiotonic constitutions and hyperadrenalism—Familial constitutional hypertonia—Arteriocapillary fibrosis and hyperthyroidism—Anomalies of venous walls—Inadequacies of lymphatic circulation—Constitutional inadequacy possible without recognizable morphological changes—Idiopathic cardiac hypertrophy—Certain cardiovascular neuroses dependent on imbalance of sensory and motor nervous system of heart—Diminished resistance of cardiac tissues to toxins.

When, as often happens, there coëxist in one and the same subject a number of constitutional anomalies of form, size, structure, tone and contractile energy, and of trophism of the heart, arteries, veins, capillaries and lymphatic vessels, we have that state of the constitution that may synthetically be described as *constitutional inadequacy of the circulatory system.* Under this head we include both a diminished functional output of the entire circulatory apparatus and also its particular state of disease, its abiotrophy, and its diminished resistance to harmful agents.

We must first of all consider the phenomena of cardio-vascular hypoevolutism, the so-called hypoplasia of the heart, narrowness of the aorta, hypoplasia of the arteries and capillaries, with which, according to the modern findings of De Giovanni and Brugsch, a state of lymphatic hyperplasia and an excessive development of the lymphatic and venous vessels are, as a rule, coördinated. Here we have constitutions abounding in degenerative stigmata and other signs of organic immaturity, as we have already pointed out in connection with the hypoplastic varieties of the microsplanchnic and megalosplanchnic constitutions and the status thymico-lymphaticus of Paltauf.

In addition to the abnormally small size of the heart (for the clinical criteria for this estimate, see page 58), the signs of an infantile type of heart are as follows: The *mitral configuration*, or heart in which the right portion preponderates; dextrocardia or *median situa-*

tion of the heart, in which this organ extends as far to the right as it does to the left of the mid-line of the sternum (a position normal in anthropoid apes); the relative preponderance of the pulmonary artery over the aorta, and in the roentgenological picture the abnormal protrusion and pulsatility of the pulmonary arch, which is often accompanied by an accidental systolic, or, better, postsystolic murmur on the pulmonary artery, which may be short and loud, sometimes rough, well localized, poorly transmitted, not palpable, more strongly variable in the horizontal position than in the vertical. This is sometimes accompanied by a second strong pulmonary sound like blowing, which seems to be physiological in children (Luthye and Bauer), and which may also be redoubled, but has nothing to do with hypertension of the pulmonary circulation. Other characteristics of cardiac infantilism are the high position of the apex and the aortic arch, the latter of which may in the roentgenoscopic picture reach the clavicle; the frequent hypotonia of the walls of the heart or Hoffmann's *cordatonia*, which may be demonstrated with the roentgen-rays, owing to the fact that the heart rests upon the diaphragm like a bag with flaccid walls, and the further fact that at every inspiration its angle of inclination diminishes much more than in the normal heart (Zeebe); furthermore, at every deep inspiration the pulse becomes very small or ceases altogether (*pulsus respiratione inaequalis seu intermittens*) and the veins of the neck swell, owing to the suction exercised on the hypotonic cardiac walls by the intrathoracic inspiratory void (Wenckebach), which hinders the inspiratory withdrawal of the blood from the ventricles.

In these hearts, moreover, we meet with the so-called respiratory or vagotonic arhythmia and at times with an excessive length of the point S in the electrocardiogram, which is a normal finding in young infants, according to Kraus and Nicolai.

To this we must add the marked instability of the cardiac action, the ready changes in the rate of the heart-beat and in arterial pressure, habitual hypotension and poor resistance to fatigue and effort. Sometimes the hypoplastic heart takes on the form of the so-called *drop-heart* (*hanging heart, cor pendulum*) in which its position is vertical and median at the same time, its shape long and narrow, with the lower pole as though detached from the vault of the diaphragm, especially during deep inspiration; moreover, the heart is farther away from the thoracic wall (*situs cordis profundus*), a position held by H. Frey to be a stigma of phylogenetic hypoevolution of the heart. By means of the roentgen-rays we observe, in addition to the greater transparency of this heart, the fact that the left margin pulsates synchronously with the right, which in this case is represented by the margin of the right ventricle and not by the right auricle, as is normal. Finally, Wenckebach has observed in the drop-heart the phenomenon of Oliver-Cardarelli, consisting of the drawing downward of the laryngo-tracheal tube at every systole. To this may be added all the other characteristics of cardiac hypoevolution mentioned above for the hypoplastic heart in general.

Coming now to *aortic narrowness,* we find that this may also exist independently of *microcardia* (Adler and Krehbiel, Brugsch); sometimes it is limited to certain segments of the vessel, as, for example, the abdominal aorta, as Neusser and I have observed; again, only certain branches of the aorta may appear hypoplastic, such as a coronary artery (Ortner), resulting in insufficient development of the corresponding ventricle; or a splenic artery, causing splenic hypoplasia (von Hansemann), or one or both of the renal arteries, leading to renal hypoplasia and, later, to contracted kidney, etc.

The stenotic hypoplastic aorta presents a diminution of the elastic and muscular tissue (Wiesner), a fatty degeneration of the intima (Kolisko), and a tendency to premature sclerosis, which explains its easy rupture and the formation of aneurysms in young subjects. A sufficient approximation of the caliber of the aorta *in vivo* is possible today by means of the roentgenological method of Kreuzfuchs, and also by the method of Lippmann and Quiring: the orthodiagraphic caliber of the ascending aorta in adult subjects is about 2.85 cm. (Weiss and Lauda). We are already familiar with Brugsch's cardio-aortic index for the judgment of relative hypoplasia of the aorta. Subjects with narrow aorta can sometimes be recognized clinically even from childhood by their extremely pallid or chlorotic coloring (due either to the lymphatic-chlorotic condition of their blood or to the extreme narrowness of the cutaneous capillaries), by their angelic or madonna-like faces, by the tendency to epistaxis and cutaneous hemorrhages (capillary fragility), by a feminine, infantile, soft skin, which is poor in pigment and hair, by the fragile skeleton and weak muscles, although in some cases the muscular system may be well developed; by the frequent presence of symptoms of hypogenitalism, hyperthymism, infantilism and adenoidism; by habitual acrocyanosis and hypothermia, combined in some cases with a general subnormal temperature and lack of fever even in diseases that are habitually accompanied by fever (Ortner); by a tendency to syncope and to palpitations after even light effort. The radial pulse is sometimes thready, sometimes hard and hypertonic (Romberg's *juvenile rigidity of the arteries*). Frequently there are also signs of status thymico-lymphaticus.

A characteristic of this condition is the disposition to tuberculosis and to all infectious diseases, poor resistance to all intoxication, and, most of all, the tendency to sudden death, which may take place under various conditions: after some minor surgical operation or other psychic trauma; after anesthesia, even though this be produced by ether and be of short duration; after a cold bath or during the course of an acute infection, etc. These are cases of so-called *mors thymica*, and at autopsy we find a large thymus, chromaffin and genital hypoplasia, and a marked status lymphaticus. At other times death is occasioned by the detachment of thrombi which have formed in the heart, hence by pulmonary embolism, or by ruptured aneurysms or cerebral hemorrhages due to early formation of miliary aneurysms in small cerebral arteries with hypoplastic walls.

Hemophilia and hemorrhagic diathesis are frequent in arterial hypoplasia. This tendency may be due to a constitutional brittleness of the arterial capillaries or to insufficiency of thrombokinase in their endothelium, or again to poverty of thrombocytes or to asthenia of these (see above).

To explain the disposition, often familial and hereditary, and in some cases even regional, of certain individuals to arteriosclerosis, we must call in a constitutional inadequacy of the arterial walls in the sense of an abiotrophy and easy exhaustion of these. According to the doctrine developed by Heilner on the local protective properties of each tissue toward substances that have a physiological affinity for the tissue in question (*Affinitätschütz*), the intima of the arteries, when it loses such defensive powers, can easily be penetrated by substances that have an affinity for it. We find, for example, from modern investigation that cholesterin ethers and calcium salts circulating in the plasma are able to penetrate the intima, where they produce fatty infiltration, followed by connective-tissue reaction and calcification, which lead to sclero-atheromatous lesions.

Now we may assume a constitutional miopragia of the intima, and it is natural that this should exist especially in hypoplastic arteries, such as are found in lymphatic and thymico-lymphatic subjects and in arteries that abound in connective tissue, as is the case in the fibroplastic diathesis of arthritics, where, be it noted, the endothelium of the articular tissues and of all the serous membranes shows miopragia and a tendency to irritative, exudative and fibroplastic phenomena. Thus, in order to explain the genesis of arteriosclerosis, a predisposing importance must be definitely attributed to arterial hypoplasia and to status lymphaticus and status arthriticus. But there is also another condition of the arteries -in some ways the very opposite of that of the hypoevolutism of the arterial wall—which may represent an anomaly predisposing to vascular sclerosis; it is the condition called by Pal *permanent constitutional hypertonia* and by Frank *hypertonic diathesis.* This may, even anatomically, find a substratum in a constitutional hyperplasia of the muscular and elastic tunics of the arteries of certain youthful subjects, which has been observed by Wolkow in the so-called *juvenile rigidity of the arteries* of Romberg, that may be associated with narrowness of the aorta and cardiac hypoplasia.

Corresponding to this permanent arterial hypertonia, which we have often observed in a familial form, we find a high arterial pressure and also a hypertensive hypertrophy of the heart; it is readily understood how easily this may pass into sclerosis of the arterial walls. According to Faber's observations, these young angiohypertonic subjects with premature hypertension during adolescence have often presented symptoms of so-called *growth hypertrophy* of the heart or *cardiopathia adolescentium* (page 110). In these angiotonic constitutions it is now assumed that, among constitutional causative factors, or at least among the factors coördinated with a special condition of the arterial walls, hyperadrenalism is of importance—especially a cortical hyperadrenalism which, according to some authors, creates a constitutional state of hypercholesterinemia, that constitutes a most important concurrent factor in the production of sclero-atheromatous lesions (Aschoff).

In the cases of familial constitutional hypertonia that I have observed, the habitus of the patients corresponded to the megalosplanchnic hyperpituitary, hypergenital and hyperadrenal constitution. This accords well with the stimulatory action exerted upon the cardio-arterial muscular tonus by the genital, neuro-hypophyseal and adrenal hormones, especially after puberty, and enables us to understand also how another constitutional anomaly coördinated with the preceding in these same individuals might be a vasomotor nervous hyperexcitability, a tendency to angiospasm, a neuropathic diathesis, predominantly sympathicotonic since the aforesaid hormones stimulate the sympathetic tonus and excitability.

In considering the most serious form of arteriosclerosis, namely, *arterio-capillary fibrosis* (which has, as we know, a predilection for the kidney and leads to contracted kidney), we find that, in addition to such causes as essential or constitutional hypertonia of the capillary arterioles and hypoplasia of the arteries, a great predisposing importance can be assigned to the premature aging of the capillaries of certain organs, especially those that are called upon to perform exaggerated work, like the kidney, heart and brain. Now this aging and early senile fibrosis of the capillary system may itself be an hereditary and autochthonous, often a familial, anomaly of the capillaries, and one which in a striking way involves the capillaries of certain regions and certain organs, or it may be due to miopragia of organs which, like the thyroid, stimulate the trophism and vitality of the differentiated tissues, inhibiting the proliferation of the connective interstitial tissue. So that constitutional hypothyroidism must of itself play an important rôle in the premature aging of the arteries and blood capillaries. We may recall at this point that we have very often seen the development of contracted kidney in hypothyroid megalosplanchnics.

According to Bauer, megalosplanchnic subjects also have a singular tendency to the localization of syphilis in the aorta.

Constitutional anomalies of structure and vitality of the venous walls can also not be overlooked in those subjects who, even in youth and often in a familial form, easily develop extensive varicose veins in the legs, phlebectasia, ready thrombosis of the veins, without any demonstrable mechanical causation. The same endogenous disposition, coördinated with constitutional anomalies of the abdominal circulation (abdominal plethora of arthritics, of asthenics with insufficiency of the right heart and of corpulent individuals) must be called in to explain the tendency to hemorrhoids.

As for the lymphatic circulation and the facility with which certain subjects present lymphatic stasis in their extremities (legs, feet, backs of the hands), such as is especially observed in women of lymphatic-chlorotic type and in hypoövarian women at the critical age, the strong controlling influence of the thyroid (and probably also of other hormones) upon the lymphatic circulation leads us to assume that certain constitutions, especially certain endocrine temperaments, show a tendency to lymphatic circulatory disturbances.

Constitutional inadequacy of the circulatory organs may reveal itself even without any recognizable anatomical or morphological alterations, although the absence of these may merely indicate our inability to discover very minute structural changes in the circulatory apparatus. But here we are assisted by the functional study of the tone and contractile energy of the cardiac muscle, and especially by a careful clinical study of the readiness with which certain subjects, upon the occasion of quite trivial causes, show serious modifications of size (dilatation, hypertrophy), tone or contractility of the heart, or suffer with disorders which we customarily class among cardiovascular neuroses.

Thus it is on the basis of a constitutional inadequacy of the cardiac muscle that the so-called *cardiopathia adolescentium* of Strümpell must develop, and under this heading must also be classed cases of the so-called *growth hypertrophy* of G. See, a syndrome characterized by a certain enlargement of the cardiac area with hypertrophy often localized at the apex, by symptoms of excessive sensitiveness of the heart and precordial region, dystonia of the cardiac walls, instability and insufficiency of contractile energy, with vascular hypotension in some cases and moderate hypertension in others.

In these subjects, besides the general habitus, which is often microsplanchnic with excessive narrowness of the thorax and sometimes with constitutional hypogenitalism and hyperthyroidism, it is easy to discover certain morphological anomalies of the heart and the large vessels, which we have already pointed out in connection with cardiac hypoevolutism (relatively narrow aorta, large pulmonary artery, elevated aortic arch and so forth).

The so-called idiopathic hypertrophy of the heart is also, according to certain authors (Schrötter), related to a constitutional weakness by reason of which the heart first undergoes dilatation and then compensatory hypertrophy in order to provide for the normal exigencies of life. According to other authors, we may also believe that such an idiopathic hypertrophy is subordinated to an excessive stimulation of growth and function of the myocardium on the part of constitutionally overactive endocrine glands (thyroid, chromaffin tissue, genital glands, hypophysis). We may also recall that hypertrophic hearts and hearts with lymphocytoid infiltrates in the midst of their muscular fibers have been found in status thymicolymphaticus and in hyperthyroidism.

Furthermore, the facility with which the heart in certain subjects undergoes tonogenic or neuro-tonogenic dilatations as the result, especially, of psychic influences, shows the existence of a constitutional imbalance, an instability of the intrinsic and extrinsic nervous apparatus that regulates the cardiac tonicity, which instability is in its turn generally coördinated with an hormonic imbalance, as is shown by the existence of tonogenic dilatations in thyroid anomalies.

A *constitutional inadequacy of the system of auriculo-ventricular conduction* has also been assumed, in order to explain cases of *functional Adams-Stokes syndrome* without anatomical lesions of the bundle of His, and cases of habitual bradycardia in healthy individuals where the conduction time is lengthened. And finally, a constitutional imbalance of the sensory and motor nervous system of the heart and vessels must forthwith be accepted if we are to explain the tendency of certain individuals to cardio-vascular neuroses, which, as we know, constitute only one of the many local manifestations of the vegetative nervous diathesis, which may in one case take a predominantly sympathetic orientation, in another a parasympathetic one, and in still another a mixture of both these. This vegetative nervous diathesis is almost always found associated with an endocrine glandular diathesis, owing to the close relationship existing between the endocrine system and the autonomic system.

Lastly, the constitutional inadequacy of the circulatory apparatus may also be shown by a diminished resistance on the part of the tissues of which it is composed, such as the endocardium of the valves, the heart muscle and arteries, to microörganisms, toxins and circulating poisons. In fact, we know that lymphatic and hypothyroid megalosplanchnics and subjects with the athletic habitus show a strong disposition to valvular endocarditis and acute and chronic myocarditis, especially that of rheumatic origin—conditions that are seen far less frequently in dolichomorphic constitutions and in Stiler's asthenics.

CHAPTER V.

CONSTITUTIONAL INADEQUACY OF THE RESPIRATORY APPARATUS.

Anomalies of nose and nasopharynx—Adenoidism—Its relation to tuberculosis—Association of adenoidism with anomalies of skeletal trophism—Dysgenetic coördination in growth of superior maxillary—Syndromes resulting from adenoidism—Adenoidism only one exponent of a degenerative soil—Dominance of parasympathetic tonus in adenoid subjects—Relation of laryngeal to sexual development—Strength or weakness of larynx an index of the general constitution—Anomalies of the bronchial tree—Exudative diathesis with stenotic tendency—Asthmogenic disposition due to imbalance of the endocrine-vegetative system—Parasympathetic predominance in recurrent respiratory catarrh—Substantial emphysema—Dolichomorphic tendency to pulmonary tuberculosis.

Anomalies of the initial portion of the respiratory canal, the nose and nasopharyngeal cavity, are of great interest to constitutional pathology. Stenosis and obstruction of these first air-passages, which purify, warm and—perhaps by means of correlating mechanisms of which we still know very little—uniformly distribute the air to the entire alveolar surface, constitute a very common condition, leading to harmful consequences that are not limited to the respiratory apparatus but may very possibly be extended throughout the whole organism.

A narrow nose, one that is flattened transversely with very thin roots and bridge (knife-like nose) is not infrequently found in the microsplanchnic or dolichomorphic constitutional ectype, in just that type that abounds in stigmata of hypoevolutism (see page 111). I find this type of nose very frequently in Basedowians. This narrow nose may be of normal length, or may be very long and aquiline. The narrowness of the nasal passages may involve both halves of the nose, or if, as is often the case, the septum is deviated to one side, only one-half. This deviation of the nasal septum is believed by certain authors to be a frequent finding in candidates for tuberculosis.

But far more frequent than this is the nasopharyngeal stenosis due to hyperplasia and hypertrophy of the lymphatic tissue of the mucosa of this region and, more commonly, of the tissue whose conglomeration forms the *pharyngeal tonsil.*

It is this hyperplasia and hypertrophy of the pharyngeal tonsil that forms the characteristic substratum of what we term adenoidism.

The study of adenoidism, its etiology and relations to internal pathology, has been the object of numerous investigations to which during the last few years the Italian otorhinolaryngoiatric school has made important contributions (Gradenigo, Poppi, Citelli, Grazzi, Masini, Caldera, Agazzi, Torrini and others). For details the reader is referred to Poppi's recent essay (*L'hypertrophie de l'amygdale pharyngée,* Paris, Amédée Legrand, 1921, "Monographies otorhinolaryngologiques internationales").

We shall here limit ourselves to the observation that adenoidism is always a sign of a serious general constitutional anomaly and belongs among those constitutional ectypes that we have studied as status lymphaticus and status thymico-lymphaticus, exudative and arthritic diathesis, and vagotonic diathesis. It may be associated in the more marked cases with rather serious stigmata and degenerative states, such as oxycephaly, deafmutism, idiocy, cretinism, goiter, status thymicus, acrocephalo-syndactylia, facial asymmetry, bifid uvula, cleft palate, hare-lip, myxedema, Basedow's disease and so forth.

But we are especially interested in the study of phenomena that seem secondary to hypertrophy of the pharyngeal tonsil, although in judging of the causation of these it is necessary to proceed with great caution, so as not to commit the error of confusing a relation of simple *coördination* between two phenomena with one of *subordination.*

Starting with the results in the respiratory apparatus, it is interesting to note a fact that was brought out graphically by Hofbauer, namely, that in oral respiration the upper parts of the thorax do not expand during inspiration as they do in nasal breathing. This explains why in adenoidism a state of chronic atelectasis of the apical regions is slowly produced, which undoubtedly predisposes to the localization in these of Koch's bacillus. Moreover, various deformities of the thorax have been observed in young adenoid individuals in whom the costal walls are soft and easily liable to become deformed, and are perhaps also more yielding than in the normal subject (Ostino), for adenoidism may be associated with anomalies of skeletal trophism (rickets being quite frequent, according to Marfan). In some cases we have the asthenic paralytic thorax, flattened in the antero-posterior direction, in others the keelshaped thorax, flattened transversely, and in still others a circular flattening of the thorax corresponding to the upper insertions of the diaphragm, with dilatation of the parts above and atelectasis of those below. All these deformities are explained by various authors as due to the insufficient volume of air breathed in through the mouth, so that when a respiratory movement occurs the air that enters the lung is not sufficient to overcome the negative intrathoracic pressure all at once, and, consequently, the predominance of the atmospheric pressure over this is felt chiefly on the less-resistant portions of the thoracic box. In some cases we also observe, as an effect of nasal stenosis, lordosis of the cervical vertebræ, dorsal kyphosis and often slight scoliosis, with corresponding thoracic deformations. But besides this mechanical genesis of the respiratory consequences of nasal stenosis, we cannot exclude the probability that there must also enter into the situation a disorder of more complex trophic and functional correlations that exist between nose and lungs. This is suggested by the fact that the stenosis of a single nasal fossa suffices to produce the apical atelectasis of Krönig and a chronic irritative condition of the apex on the same side. Hence the question arises whether there is not a trophic relation, through the nervous-humoral pathway, between the lung (especially the apex) and its corresponding *respiratory duct* as far as the nostrils.

On the other hand, we must invoke relations of simple dysgenetic coördination to explain the serious arrest of development of the superior maxilla found in adenoid individuals, consisting in the approach and lateral flattening of the two alveolar and palatine processes and their union in the median line in the form of a V (*ogival palate*), elevation of the palate, forward projection of the incisive bone and the incisors (superior prognathism). As is seen, we are dealing here essentially with hypoevolution of growth in width of the superior maxilla, to which there is a perfect correspondence in the arrest of growth in width of the entire face and nose in adenoid subjects, when, as frequently occurs, the nose is sharpened to resemble a knife edge, as we have shown above. But we may also find in adenoid subjects another type of nose, the short nose with nostrils curved back, with a widened bridge and roots. This is a still more serious form of nasal hypoevolutism, which is coördinated with hypoevolutism of the base of the skull and of the orbital cavities (round, protruding, small eye of adenoid subjects).

To complete the adenoid facies and to accentuate the leptoprosopia or narrow face, we have in addition an extreme shortness of the upper lip, which exposes the incisors to view, the mouth remaining permanently half-open, the mandible dropping, with a downward droop of the soft parts of the face, causing the normal nasogenial and nasolabial folds to disappear; also dental ataxia and diastemata, hypermegaly of the two middle incisors with smallness of the lateral ones, hypoplasia of the enamel and half-moon shape of the crown; added to which we observe an immobile, atonic look, a pallid complexion and frequently a continual meaningless laugh upon the face. Thus we find a physiognomy of dulness and stupidity characterizing adenoid subjects.

We need only mention briefly the coördination of adenoidism with the most varied symptoms and syndromes, some of which have been seen to disappear or diminish after removal of the adenoid growths. Such are cases of bilateral exophthalmos, of bilateral glaucoma, strabismus, poor vision, incoercible headache, Basedow's disease or basedoid syndromes, simple goiter, melanodermia and Addisonism, skin discolorations, enuresis, hypopituitary and dysgenital (dysmenorrhea) syndromes, hematic, circulatory, dyspeptic, nervous and psychic syndromes, all of which may be cured or improved after removal of the adenoids.

It is easy to assume—in fact, many authors have not shrunk from such an explanation—that all these syndromes are etiologically and pathogenetically subordinate to hypertrophy of the pharyngeal tonsil, and thus to coin daring hypotheses of a special function or special functional correlations belonging to this tonsil. Especially in recent times it has been assumed that it would be possible for such an hypertrophy to react unfavorably upon the neighboring pharyngeal hypophysis and also on the cerebral hypophysis, and thus to produce either dysfunction of the hypophysis or states of imbalance of the entire endocrine system with changes in whatever gland is predisposed, leading to manifold disturbances of the various organs and apparatus.

But we must reflect that adenoidism is only one of the exponents of a degenerative soil upon which these syndromes may, and habitually do, germinate even when there are no adenoid growths; that cases of exophthalmos, glaucoma, Basedow's disease, hypopituitarism, etc., that are apparently secondary to adenoid growths of the nasopharynx, are infinitely rare in comparison with the frequency of the adenoid growths themselves. Even when, after the removal of the hypertrophic tonsil, we see a given syndrome of a distant organ disappear, we may assume that the hypertrophy of the pharyngeal tonsil was acting only as a provocative agent, as a contributory condition for the development of the disease of that particular organ which was already predisposed to illness owing to indispensable or imposed constitutional factors, or because of the same fundamental constitutional anomaly that is at the bottom of adenoid growths (lymphatic, arthritic, dysglandular diathesis, etc.). If the thyroid gland, for example, has a tendency to react with hyperfunctioning to circulating toxins and poisons, and if this predisposition to Basedow's disease exists, as is frequently observed, in a subject who shows status lymphaticus or constitutional vagotonia (Eppinger and Hess) and who may also frequently manifest a tendency to hyperplasia of the nasopharyngeal lymphatic tissue, we can readily understand how the hypertrophic pharyngeal tonsil might easily provoke the onset of hyperthyroidism by putting into the circulation abnormal products of metabolism of its tissues (still without supposing any internal secretion of the tonsil), just as a chronic alveolar pyorrhea might do this in a person who is predisposed. Similarly in cases of so-called reflex asthma from the nose, it is possible that the concurrence of chemical or nervous irritations starting from the nose or nasopharynx is sufficient, when acting on an asthmogenous soil, to usher in asthmatic crises or to maintain a degree of bronchial hypersensibility sufficient to cause the repetition of the attacks; but this does not mean that *all asthmatic disease* is of nasal origin.

We may not overlook the fact that, according to Eppinger and Hess, there is a dominance in adenoid patients of the parasympathetic tonus. Now it happens that precisely those syndromes that are believed to be secondary to adenoid growths, such as asthma, enuresis, dysmenorrhea, muco-membranous enteritis, hyperchlorhydria, cardio-vascular vagotonic neurosis and vagotonic basedoid syndromes, are syndromes of parasympathicotonia. On the other hand, we know that it is easily possible for the nasopharyngeal mucosa to discharge stimuli upon the encephalo-medullary centers of the parasympathetic system through the afferent pathways of the trigeminus, the vagus, the glosso-pharyngeal nerve and also the sympathetic, as is now demonstrated by the study of the oculocardiac and nasocardiac reflexes. For a moment, therefore, we might be led to suppose it possible for the aforesaid parasympathicotonic syndromes of adenoid subjects to depend upon a reflex nervous action of the adenoids upon the parasympathetic centers. But we have only to consider that constitutional parasympathicotonia may be perfectly independent of the presence of adenoids, and that even after the removal of these the subject always remains a potential parasympathicotonic, to be convinced of the extreme caution that is necessary in judging as to whether two facts are so related that one is subordinate to the other, or whether they are simply coördinate.

We may, however, assume that even if several pathological manifestations are only coördinated by a mutual constitutional anomaly, such as vagotonia represents in the foregoing example, one local manifestation may easily act on the others in accordance with the principle of morbid sympathy between the parts of the body most intimately connected by neuro-chemical bonds, so that, if the anomaly of one part is aggravated pathologically, it may by reflex action provoke in other parts the clinical manifestation of anomalies hitherto latent, just as the cure of one part may drive back into latency the consensual morbid reactions of other parts. We must also mention here the interesting researches of Livierato and his pupils (Vattuone, De Farmachidis, Canestro), demonstrating the blood-sugar reducing action of the tonsils and the importance of these organs for the sugar metabolism. This enables us to assume that they stimulate the hepatic vagus with an hormonic product, acting in the same way as insulin.

Coming now to the remaining portions of the respiratory apparatus, we shall refer briefly to the relations existing between the development of the larynx and sexual development, to the laryngeal hypoevolutism that manifests itself in a feminine form of larynx and a high-pitched or feminine or even puerile voice in adult males with genital hypoevolutism, such as are many microsplanchnics of asthenic, hypoplastic and eunuchoid type. In asthenic women with genital hypoplasia we also find a thin, delicate, high voice. It is interesting too to observe how constitutional weakness of the larynx and the motor muscles of the vocal cords reveals itself by the readiness with which dysphonia appears upon a slight cold or after vocal strain. We find these attacks of aphonia with relative frequency in candidates for pulmonary tuberculosis. We know, moreover, that in women at the critical age the larynx and vocal cords thicken and the voice often acquires a more or less pronounced masculine timbre. We must also recall the veiled, deep, hoarse quality of voice that we frequently find in vagotonic subjects, and the tendency to chronic catarrh of the larynx in arthritic diathesis.

The strength or weakness of the larynx and voice, and perhaps also its timbre, may, therefore, represent an excellent criterion for judging of the subject's general constitution. In this connection the study of the relation between the constitution and the art of singing would be rather interesting. I think it not improbable that the various artists who sing tenor, baritone, bass, soprano or contralto must have a special somatic constitution from the point of view of the vegetative nervous equilibrium and the degree of functioning of certain hormones (especially genital and perhaps also hypophyseal and adrenal), in view of the intimate relation of the endocrine vegetative system to the development, tone and motility of the vocal cords, and to the expression of the emotions, of which voice and song constitute the most perfect and effective instrument.

According to investigations that I have made in collaboration with my pupil Quaranta, tenors are generally brachymorphs of the hypothyroid or hypothyroid-hypogenital variety; dramatic sopranos also frequently have a brachymorphic habitus with hyper-ovarian marks; baritones and basses, on the other hand, more frequently present a dolichomorphic hyperthyroid-hyperpituitary or hyperthyroid-hypergenital habitus, while in mezzo-sopranos the dolichomorphic habitus predominates with notes of masculinism.

Passing now to anomalies of the bronchial tree, we already know that one of the more characteristic manifestations of the exudative and arthritic diathesis is the tendency of the bronchial mucosa to recurrent congestive and catarrhal phenomena. These are accompanied by that other characteristic of exudative diathesis, the dyspneic or stenotic tendency, due either to intense vasomotor or vasosecretory edema of the mucosa or to the often coëxisting vagotonic and spasmophilic diathesis, by virtue of which Reisseissen's muscles easily undergo reflex contraction, thus narrowing the bronchioles. In this way there is an easy transition from asthmoid bronchitis to bronchial asthma, whose soil is the same as that which we have just recalled, and attacks of which can be provoked by various conditions, especially by those that hypersensitize the mucosa, the muscles and the vagal terminations of the bronchiolar wall, through the mechanism of anaphylaxis. But we must not think that the anaphylactic factor is the *essential cause* of asthmatic disease; rather, it serves, or may serve, in a given number of cases as an exciting or contributing cause, for the *asthmogenic disposition* always remains the fundamental cause of asthma, one that demands, according to the results of modern investigations, a special constitutional imbalance of the endocrine-vegetative system, and a special *colloidoclastic diathesis*. Otherwise we could not account for the fact that among so many individuals exposed to the same anaphylactizing substances only a few become sensitized and have the anaphylactic phenomena localized in the bronchial tree (Widal).

It is interesting to note how frequently we observe chronic or recurrent catarrh of the respiratory passages in constitutions with parasympathicotonic predominance, such as are found in megalosplanchnics and in those microsplanchnics who have lymphatic, hypoadrenal and hypogenital constitutions, whereas there are dolichomorphic sympathicotonic subjects who, even when they show a tendency to pulmonary tuberculosis, have not, as we should expect, a history of chronic or recurrent bronchitis.

We also find a condition of constitutional parasympathicotonia in subjects suffering from attacks of nervous vasomotor rhinitis, syndromes which, as we know, are closely related to asthma and spasmodic or asthmatoid bronchitis, and which likewise show a strong affinity for the large family of angio-neurotic edemas of Quincke (it being possible for such an edema to involve the glottis also and to result in death). The fact that, in certain individuals, these attacks of constitutional bronchitis and rhinitis appear in a hypersecretory form (mucous and bronchorrheal bronchitis) while in others they take a dry form may perhaps be explained by a different orientation in the latter of the vegetative nervous system (sympathicotonia rather than parasympathicotonia? predominant stimulation of the nerves inhibiting secretion and of the vasoconstrictors?).

Another sign of constitutional inadequacy of the respiratory apparatus, one that involves chiefly the elastic tissue but which likewise flourishes in the same territory of asthma and respiratory vagotonia, is *substantial emphysema*, a kind of premature aging of the elastic tissue of the lung which leads to atrophy, owing to the mechanical dilatation of the alveolar walls. This early senescence may also, as W. A. Freund has shown, manifest itself in the costal cartilages, where it may lead to premature degeneration and calcification, with consequent inspiratory rigidity of the thorax. It may also attack the cervico-dorsal vertebræ, causing a kyphosis of these, described by Leschke as a causal factor in emphysema. In juvenile emphysema Eppinger and Hess regard vagotonic hypertonia of the bronchioles as the pathogenetic factor of the alveolar distention, because the air tends to be retained in the alveoli owing to the permanent stenosis of the bronchioles.

We shall not go very deeply into the *local reasons* for the predisposition to tuberculosis, since we have already touched upon this subject in dealing with the microsplanchnic habitus and with the importance of the dolichomorphic type of thorax with or without Freund's sign. The investigations of Fici of our school, which are in accord with the recent results reported by Brugsch and Bauer, show the great preponderance of individuals with the dolichomorphic type of thorax among tuberculous subjects, and fail to sustain the objection that this same paralytic, narrow thorax is a consequence of a pulmonary tuberculosis that has long remained latent.

It is now generally recognized that thoracic dolichomorphism by itself is not sufficient to produce a disposition of the lung to tuberculosis, but that other coefficients of equal importance and perhaps more decisive than dolichomorphism itself are necessary. Among such coefficients we must especially reckon the small size of the heart in a paralytic thorax, or, at least, as Schluter rightly maintains, the constitutional functional weakness of the heart, which leads to chronic undernutrition of the lungs, especially of their higher parts which receive less blood (the capillary blood-pressure in the apices being, according to Tendeloo, only one-half that of the capillaries at the base of the lungs). The fact that the lung of the phthisic thorax is relatively very large also contributes to such undernutrition. Now since we already know that the heart is not hypoplastic and hypofunctioning in all dolichomorphic types with narrow thorax (see above), and that there are varieties of microsplanchnics in whom it may even be hypertrophic (Brugsch), and capable of sustaining great effort, especially after physical training, we can understand that there is not the same tendency to tuberculosis in all dolichomorphic thoraces.

On the other hand, as we have already pointed out, the results of Iwasaki's experiments largely modify the value that had earlier been assigned by Freund and Hart to stenosis of the upper thoracic aperture as a mechanical factor of predisposition to apical tuberculosis, a value that was seemingly confirmed by Bacmeister's experiments in rabbits. But to account for a serious attack of pulmonary tuberculosis (a disease which, as we now know, succeeds in almost 80 per cent of individuals in localizing itself in infancy at a small point of a pulmonary lobe and in the corresponding glands, where for long years it may remain quiet, latent and ready to spread and to attack and invade the apex or other parts of the lungs), we must attribute a still greater determining value to the humoral state of the organism as regards the abundance either of nutritive material or of defensive antibodies, the supply of the latter being in large part subordinated to that of the former, as Pirquet also has recently insisted. Hence an individual may have the microsplanchnic constitution, a small heart, and Freund's anomaly, and still be saved from pulmonary tuberculosis if he succeeds in maintaining a strong activity in his nutritive balance and has enough mobile antibodies in his blood or fixed in his lung cells. But clinical medicine teaches us that undernutrition and humoral dyscrasia in individuals who are subject to tuberculosis of the lungs must have something specific in their action which we do not as yet fully understand, but which is perhaps related to a special hormonic imbalance. Otherwise we could not explain how the emaciation, that is observed, for instance, in patients with Basedow's disease who are also microsplanchnics, hardly ever leads to tuberculosis, whereas the latter easily attacks the lungs in hyperpituitary giants, in eunuchoids, in men of feminine build and in hypoadrenal subjects. We know too that subjects who are rich in lymphatic tissue do not, according to Bartel, F. Kraus and others, show any predisposition to pulmonary tuberculosis, but tend rather to tuberculosis of other viscera and of the lymphatic tissues.

If, now, we recall the differentiation that I made of the microsplanchnic build into a pure hyperthyroid or hyperthyroid-hyperpituitary variety, on the one hand—with an advanced morphlogic evolution of the heart and arteries, normal evolution of the lymphatic tissue (perhaps even functional hypersthenia of this) and good development of the blood, muscles and sexual apparatus—and a variety, on the other hand, that abounds in signs of organic hypoplasia, as do the asthenic types (hypoadrenal, hypoparathyroid, hypogenital or hyperthymic-lymphatic), we shall be able to understand how—with the possible exception of the hyperthyroid-hypoparathyroid variety—the latter is precisely the microsplanchnic variety for which pulmonary tuberculosis has a predilection, while the pure variety offers considerable resistance to this terrible scourge.

The special endocrine varieties of the microsplanchnic constitution—with their different combinations with lymphatism and the different characters of this latter (whether asthenic or hypersthenic, hypofunctional or hyperfunctional), and with the different orientations of their vegetative nervous system (predominantly sympathicotonic in hyperthyroid microsplanchnics, vagotonic in thymicolymphatics, hypoadrenals and hypogenitals, and mixed or polytonic, but with a preponderance of vagotonia in hyperthyroid-hypoparathyroid or spasmophilic subjects)—explain many facts relating to the varying course taken by pulmonary lesions and the different kinds of extrapulmonary symptomatology in tuberculosis of different humoral-endocrine type.

These matters represent a rather large chapter of pathology and of clinical tuberculosis with which we have expressly occupied ourselves, but which we must now for the sake of brevity pass over.[1]

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[1] In the valuation of the lymphatic factor in the predisposition to tuberculosis we attribute great importance to the degree of functioning of the lymphatic tissue (reticulo-endothelial cells and lymphocytes). Large glands may be miopragic or hyperpragic, and may produce few or many antibodies against Koch's bacillus. It is in this direction that we must turn our attention henceforth in our investigations of constitutional lymphatism.

CHAPTER VI.

CONSTITUTIONAL INADEQUACY OF THE DIGESTIVE APPARATUS AND ITS ACCESSORY GLANDS.

Anomalies of tongue, teeth and salivary glands—Relation to instability of humoral balance—Esophageal stigmata of degeneration—The hypersthenic and the asthenic stomach—Tonus of gastric walls in megalosplanchnic and microsplanchnic subjects—Difference in amount of gastric juice Shape of stomach—Functional anomalies of tonus and peristalsis, of secretion and sensibility—Peptic ulcer—Its relation to the asthenic microsplanchnic type—Secretory inadequacy Gastric hypertonia and constitutional sympathicotonia—Anomalies of intestine—Its mucosa a mirror of the humoral balance—Hypo-evolutism of appendix in lymphatic subjects—Appendicular irritability and endocrine constitution—Hemorrhoids frequent in lymphatic-arthritic conditions—Intestinal flora and constitution—Anomalous position of colon—Anomalies of liver, pancreas, spleen—Bilious temperament—Cholesterin diathesis in arthritics—Hemolytic icterus Diabetes—Splenomegaly.

Everyone knows the great differences that exist between one individual and another with regard to the functional energy of the digestive apparatus, the alimentary tendencies, the tolerance or intolerance for certain special foods, the habits of defecation and the quantity and quality of the feces. Some individuals bolt their food, others have to swallow it slowly, helping its descent into the stomach by draughts of water; some need to drink large amounts of water during or after meals, while others cannot take much fluid into their stomach without suffering from it; some have a ready flow of saliva, in others this is very scanty and thick; some, even while feeling very well, form large quantities of gas in the stomach and large intestine, while others seldom pass flatus from the stomach or rectum. Even the odor of these gases has, not infrequently, a personal characteristic which depends, as we know from modern investigations, upon the fact that the bacterial flora in the large intestine varies from one individual to another. And what shall be said of the innumerable individual pathological tendencies of the digestive apparatus? We shall review these briefly in this chapter.

Starting with the buccal cavity and considering first the constitutional anomalies and variations of the tongue, teeth and salivary organs, we find that the tongue furnishes us with useful indications both as to the functional behavior of the digestive apparatus and also as to the individual's general constitution. The various degrees and types of coated tongue seem, according to Audrain, to be especially related to the defensive reaction of the lymphatic tissue of the Malpighian epithelium of the lingual mucosa against poisons and toxins either formed in the gastro-intestinal tube or circulating in the blood. The more serious the intoxication the more easily does the lingual mucosa undergo either degenerative, necrobiotic and desquamative processes, or stasis of its lymphatic circulation, or exhaustion of its glandular secretion, even to the parched tongue of sepsis and serious toxemic states.

The synergy of the lymphatic tissue of the lingual mucosa with the reticulated and agminated lymphatic tissue of the rest of the digestive tract easily explains why the tongue is a true mirror of the toxic-irritative state of the intestine and why it clears up when the poisons forming in the gastro-intestinal tube are expelled or when the defensive activity of the gastro-intestinal mucosa gets the upper hand. In certain individuals we habitually find a coated tongue, in others, one that is permanently bright red as though skinned; in others, the so-called geographic tongue, with spots of coated mucosa and other spots where the mucosa seems to be lacking; in others, a furrowed, almost cracked or scrotal tongue; finally, in still others, the lingual surface is dotted with numerous small excrescences, with raised papillæ and markedly hypertrophic lymphatic follicles, especially at the base.

We do not fully understand the significance of all these various appearances of the lingual mucosa, but we know that they are found in subjects with signs of the three closely related diatheses—the lymphatic, the exudative and the neuro-arthritic—in which there exists an instability of the humoral balance, an alternation of autointoxication and detoxication, to which, as we know, the lymphatic tissue and the Malpighian layer of the skin and mucous membranes, including that of the tongue, react in a particular manner with their energetic protective action. In this way we are able to explain the appearance of a tongue with lymphoid hypertrophy, a coated, filmy, intoxicated tongue, or a tongue that is desquamated or skinned, either diffusely or in spots.

We may also mention the large fleshy tongue of hypothyroid individuals, the thick tongue abounding in connective tissue, found in the hyperpituitary type, and the smoked tongue of hypoadrenal subjects.

It is very probable that for any given constitutional stigma of the tongue there is a corresponding characteristic of the gastric or intestinal mucosa, judging from the fact, for example, that the geographical and the permanently coated tongue are not infrequently associated with gastro-intestinal vagotonia (Eppinger and Hess) and the furrowed and scrotal tongue with constitutional achylia (Schmidt).

With regard to the salivary glands we may recall the abundant salivary secretion of vagotonic constitutions, and the dry mouth of sympathicotonic constitutions; the special constitutional hypertrophy of the salivary glands, especially of the parotids, in certain obese individuals, in the neuro-arthritic diathesis in general, and in certain hypogenital constitutions, since a trophic relation seems to exist between testicles and parotids and even between the testicle on one side and the parotid on the same side (Bauer). The constitutional variations of the physico-chemical quality of the saliva also deserves particular study.

We shall not linger over dental anomalies, since we have already mentioned these in our chapter on the skeleton; we shall likewise pass over anomalies of the hard and soft palate and of the pharyngeal mucosa, particularly its lymphatic tissue, which behaves like that of the mucosa of the nose.

We shall simply point out the tendency of the esophagus in certain subjects to localized spasms (esophagospasm), which may in the course of time be accompanied by fusiform dilatations of the esophageal tract situated above the point made stenotic by the spasm; this esophagospasm is part of the vagotonic diathesis (Eppinger and Hess, Heyrowsky).

Other subjects, on the other hand, have esophageal atony, an insufficiency of the peristaltic function of the esophagus, which grafts itself upon the asthenic constitutions of Stiler and may lead to dysphagia and esophageal dilatations. To a constitutional insufficiency of tone of the cardia and hence to its insufficient closure, very likely associated with gastric spasmophilia, must be referred the tendency of certain individuals to eructations, vomiting, regurgitation and even, according to some authors, the phenomenon of *rumination* (merycism). This last is rather an important stigma of degeneration, which is frequently met with in neuropaths and psychopaths, and discloses a serious hereditary gastro-esophageal dyskinesia.

Coming to the individual gastric constitution, we can at once determine on the basis of the functional criterion two great types of stomach: the *hypersthenic,* strong and capable of utilizing a large quantity of food, and the *asthenic,* weak, limited in its digestive resources and incapable of functional effort.

We already know that the first type is characteristic of the megalosplanchnic and the second of the microsplanchnic constitution. The megalosplanchnic individual is the type of eater and drinker who has a large stomach into which he can throw almost anything he wishes, while the microsplanchnic subject, even if he has a good appetite, feels that his stomach is easily filled and does not allow him to abuse either eating or drinking. Sometimes also the rapidity with which microsplanchnics eat is striking, especially those of hyperthyroid type, in comparison with the slowness of many megalosplanchnics. This rapidity and slowness are not always voluntary or due to habit, but are, I am convinced, easily explainable by the different and antithetic orientations of the tone of the gastric walls (possibly also of the esophageal walls) in these two constitutional types. When, as is generally the case in megalosplanchnics, the tone of the vagus and gastric walls is strong, the stomach (and the same is true of the esophagus as well) allows itself to become slowly distended by the food that enters; the individual can eat a large quantity, provided he gives the bag time to dilate. But if, on the contrary, the sympathetic tone dominates and the vagal tone is low, as is the case in many, though not in all, microsplanchnics and asthenics, the stomach is always wide open and the food can descend rapidly and fill it quickly.

In addition, the quantity of gastric juice, hydrochloric acid and other ferments secreted by the stomach of megalosplanchnic eaters must be supposed *a priori* to be large, while it is, on the contrary, limited in the hyposthenic stomachs of microsplanchnics. This may perhaps explain why megalosplanchnics feel the need of diluting their digestive juices during meals with plenty of fluid, while this practice is harmful to microsplanchnics with hypochylia, who cannot in fact drink much while eating. We also know that in microsplanchnics the stomach has a vertical, dolichomorphic shape with the lesser curvature and the pyloric portion more or less ptotic and displaced downward, whereas the stomach of megalosplanchnics is more brachymorphic and more nearly horizontal, that is, it has more the form and position of an infant's stomach. We may also mention the special predisposition of the strong stomach of megalosplanchnics to cancer, which may be related to the constitutional hyperplasia of the gastric glands and to the readiness with which they react with proliferative phenomena to exogenous stimuli.

In analyzing the separate functional predispositions of the stomach with regard to anomalies of tonus and peristalsis, of total secretion, of secretion of hydrochloric acid and of gastric sensibility, we find an infinitude of individual variations, which do not always—which in fact seldom—produce special disturbances, and which are often compatible with a state of sufficient well-being. So that we cannot possibly establish any constant causal relation, for example, between gastric hypertonia and dyspepsia, between hyperchlorhydria, hypochylia or achylia and dyspepsia. For no other organ, perhaps, so much as for the stomach is the state of the subject's nervous system, and especially the excitability of the sympathetic sensory pathways which transmit the internal stimuli originating in the gastric area to the nervous centers, of such great importance in the disclosure of constitutional morphological and physiological anomalies. Hence the state of hereditary balance or imbalance of the vegetative nervous system of the stomach is what in the last analysis determines the clinical exteriorization of gastric morbidity and decides the symptomatological form, not only of the so-called functional dyspepsias but also of such organic diseases as round ulcer, in the pathogenesis of which the nervous system plays the principal rôle.

By this we do not mean to maintain that autochthonous anomalies of the tissues composing the gastric walls have no importance in the genesis of endogenous gastric diseases, but that they may remain completely latent unless, as in fact usually happens, the anomalous excitability of the intragastric and extragastric nervous system is conjoined with them. And in this way we explain also the apparently paradoxical fact that anomalies of the musculature or glands of the stomach of antithetic nature, such as atonia and hypertonia, hyperchlorhydria and achylia, may manifest themselves with the same symptoms and nervous reactions (pyrosis, swellings, eructations, regurgitations, malaise, anorexia, etc.).

The understanding of gastric diseases will be enormously facilitated, therefore, the moment we know the exact innervation of this truly intelligent organ, which at times seems capricious and intolerant of all physiological law, but which, nevertheless, by virtue of the internal stimuli that it sends to the psychic centers, contributes mightily to the formation of cenesthesia, mood and individual character. But we still know very little about the reciprocal task of the vagus, the sympathetic and the ganglia and intrinsic plexuses of the gastric wall,[1] and still less about the territory of action of the two extragastric antagonistic nervous systems, since this pretended *antagonism* of the physiologists undoubtedly reduces itself, as clinical experience teaches, to a perfect harmony and synergy of the two kinds of nerves. In fact when the food, just after its descent into the cavity of the organ, is subjected to a complete mixing in the fundus portion, where it is penetrated and attacked by digestive juices, the median and pyloric portions have plenty to do on account of the increase of peristolic function of the wall, due to a sufficient excitation of the vagus, while the sympathetic keeps the door of ingress, the cardia, closed and at the same time keeps sufficiently wide open and in a state of tonicity the wall of the fundus (a true active dilatation, as Sick and Tedesko rightly assume), whose function, analogous to that of the auricle of the heart, is essentially that of a reservoir while the pars media and antrum have essentially a motor and emptying function. In this way the vagus and sympathetic act synchronously and harmoniously during digestion, the one exerting more influence on the pyloric sphincters, the antrum and the pars media, and the other acting on the fundus of the stomach and on the cardia. When these two latter portions contract the others must relax and *vice versa.* It is not correct, therefore, to speak, as we have hitherto done, of gastric atonia and hypertonia, of hyperkinesia and hypokinesia in general, since these phenomena may concern only the one or the other of the two great nerve fields of the stomach, the reservoir and the motor field, so that hypotonia and hypokinesia of the one may coëxist with hypertonia and hyperkinesia of the other, and *vice versa,* resulting, in effect, in a *gastric dystonia* and *dyskinesia.*

I repeat, however, that we do not perfectly understand the respective rôles played by the vagus, the sympathetic and the intrinsic nervous formations of the stomach in the function of controlling tonicity and in the respective kinetic or peristaltic (and also sensory) functions of the various regions of the organ. Some authors (Bickel) assume that, as regards secretions also, the vagus as well as the sympathetic contains stimulating and inhibitory fibers.

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[1] For instance, the German physiologists and clinicians, upholders of the neurovegetative pathology (see Dresel, L. R. Müller, Meyer and Gottlieb) and the Anglo-Americans assert that the vagus is the motor and tone-giving nerve of the stomach and bowels, and the sympathetic the inhibitor (only Pal assuming that the splanchnic is the motor nerve of the bowels), while Laignel Lavastine believes, together with Courtade and Guyon, that the sympathetic stimulates the slow movements and the contractions of the circular fibers and the vagus the rapid contraction of the longitudinal fibers.

From the studies of Eppinger and Hess, we know, however, that individuals in whom the tonus of the vagus is dominant (constitutional vagotonia) often have phenomena of hypertonia of the sphincter and of the pyloric and middle portions of the stomach, whence the form of a *bull's horn* seen in the gastric roentgenogram during the ingestion of the test-meal; so that in these subjects we find slow filling of the stomach, a quick sense of swelling and an actual appearance of this at the epigastrium after eating, owing to the accumulation of food, air and digestive juices in the fundus, a ready tendency to reflex disturbances of the heart due to the raising of the diaphragm, easy regurgitation, antiperistaltic contractions and vomiting, favored by the hypersecretion of hydrochloric acid (the vagus being the secretory nerve for hydrochloric acid), leading to more prolonged spasmodic closing of the pylorus, in some cases to spasm of the ring of muscular fibers which separates the pars fundi from the pars media, and to formation of an hour-glass stomach of spastic nature.

Added to this, we find various sensory disturbances, such as a burning sensation, spasmodic pains and a sense of acidity in the throat, all of which are interpreted as due to hypersecretion of acid. This interpretation is erroneous, however, since, on the one hand, these disturbances may exist even in the absence of such hypersecretion and even with low values of hydrochloric acid and, on the other hand, they may not exist at all when there is a hypersecretion of hydrochloric acid. They are nothing but signs of hyperesthesia (vagal?) of the gastro-esophageal mucosa. It is generally accepted that on this vagotonic gastric soil peptic ulcer may develop readily and rapidly, especially in those regions of the gastric wall that are physiologically more exposed to trauma, such as the parapyloric region and that of the lesser curvature (since it is now demonstrated that the food descends into the stomach by sliding along the latter).

These regions are more subject to muscular spasms, hence it is easy for small arteries of the mucosa to become obstructed. Moreover in the same individuals, owing to hypertonia of the pyloric portion, the food remains longer in the stomach, that is, emptying is slow and the acid chyme remains longer in contact with the ischemic mucosa (ischemic from spasm), which may hence be digested, especially if, in these subjects with a hypersensitive and unbalanced gastric nervous system, the vitality of the mucosa is low for reasons inhering in the general constitution (Stiler's asthenia) or for local hereditary reasons (appearance of ulcer in several members of the same family). And all this may occur independently of the coëxistence or the preëxistence of a constitutional or acquired hyperchlorhydria, since it can readily be understood that with defective trophism of the mucosa and with ischemia of this same mucosa, as the result of repeated muscular spasms (Bergmann), a gastric juice even normally or weakly acid may cause the digestion of the mucosa and so produce ulcer.[1] It is not improbable that some other change may also have a hand in the latter's genesis; that is, a constitutional or acquired change in the sensitive innervation of the mucosa, which, as in the case of the skin, must intervene to maintain the normal trophism of the tissues. In this case the neurogenous genesis of the ulcer would be the same as in tabes (Dalla Vedova).

We have now touched briefly upon all the principal links of the long pathogenetic chain of peptic ulcer. This must be considered an exquisitely constitutional disease, a true tropho-neurosis of the gastric (or duodenal) wall, which, as has been said, is so associated and confused with constitutional neurosis of the stomach that in practice it is difficult to tell where the neurosis ends and the dystrophic ulceration begins.

Ulcer, unlike cancer, attacks individuals with weak stomach, who have suffered for years and years in the past from some dyspeptic disturbance, and who, according to many authors, possess, along with stigmata of hyperirritability of the vagus—which, if not total (for instance, hyperchlorhydria may not be present) are at least partial and dissociated, as may be demonstrated by pharmacodynamic tests—a constitutional spasmophilia due to parathyroid deficiency, as has been shown by the results of investigations carried out by Peritz, by myself and by my pupil De Tullio.

From the point of view of *habitus*, these individuals often correspond to the asthenic microsplanchnic type and, more precisely, to the variety that we term hypoadrenal, hypoparathyroid, hypogenital, lymphatic and hypoplastic. In these constitutions the narrowness of the hypochondriac space may easily cause the stomach to undergo compressions and torsions, especially if these are favored by the wearing of corsets, and these in turn may possibly lead to alterations of the nutritive arterial peduncles of the stomach and to spasms of the muscular mucosa with strangling of its nutritive vessels.

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[1] Draper also has recently found that gastric ulcer is encountered with great frequency among individuals having a microsplanchnic-asthenic habitus.—S. N.

To account for the genesis of duodenal ulcer, Schmieden and O. Strauss invoke a predisposing influence of gastroptosis and of the consequent kink of the superior duodenal flexure, which favors a longer stay of acid chyme in this region.

Among sufferers with peptic ulcer we find numerous other constitutional anomalies, such as status lymphaticus (Stoerk, Bartel), a nodulated condition of the gastric mucosa which is characteristic of lymphatic individuals, status chloroticus (Bartel), and, according to some of my observations, also utero-ovarian hypoplasia,[1] which leads me to believe there is a greater frequency of gastric ulcer in women (ulcer of the duodenum and jejunum predominating in men).

We must now take up another important constitutional anomaly of the stomach, *secretory insufficiency*, *achylia* or *hypochylia*, *hypochlorhydria* and *heterochylia*.

Complete *achylia* (lack of all ferments) or partial achylia (absence only of free hydrochloric acid) is found as a degenerative stigma of high value (Albu, Martius, Stiler, Zweig, etc.) in several members of the same family, very often associated with neuropathic diathesis, with the asthenic or lymphatic habitus, geographic tongue, exudative diathesis, alimentary idiosyncrasy, perversions of appetite, constitutional albuminuria, lymphocytosis-neutropenia, constitutional bradycardia and various endocrine anomalies, such as hyperthyroidism, endemic goiter, hypogenitalism and diabetes. It is especially interesting that a common soil is often found for achylia and hypochylia on the one hand and for pernicious anemia and leukemia on the other (see above).

In the genesis of this secretory anomaly we cannot tell how much importance should be assigned to the protopathic weakness of the secretory cells and how much to the state of constitutional vagal hypotonia. As is well known, achylia is frequently accompanied (but not always, because the disturbance is at times latent!) by a gastric hyperperistalsis, a permanent opening of the pylorus, and hence secondary intestinal disorders (gastrogenous diarrhea). The histological examination of the gastric glands may be negative in cases of achylia. Sometimes states of achylia and hypersecretion or of hyperchlorhydria (heterochylia) alternate in the same subject. We are evidently dealing here with instability of the gastric secretion, such as is not infrequently observed in certain endocrinopathic constitutions, especially hyperthyroid and hypoparathyroid constitutions. Albu cites cases in which he has seen an acute achylia appear and then rapidly disappear. It is very probable that a condition of constitutional gastric sympathicotonia predisposes to such phenomena of paroxystic secretory inhibitions of the stomach.

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[1] It is common to find peptic ulcer associated with chlorosis and hypoövarism.

Moreover, to explain so-called *gastric hypotonia* I believe that the existence of a state of constitutional sympathicotonia may be called in, such as we easily find in dolichomorphic hyperthyroid individuals, according to my investigations. This gastric hypotonia has nothing in common with peristaltic insufficiency, since it may very well coëxist with even an overactive peristalsis; for, as we have already pointed out, the preponderant tonus of the sympathetic is associated with a condition of diminished tonic retraction of the pylorus and pars media (hypovagotonia), and hence with a more ready emptying of the stomach.[1] It is of interest that in these dolichomorphic sympathicotonic individuals there are, as a rule, none of the digestive disturbances that are so frequent in vagotonics, that is, in gastro-hypertonics! Gastric hypotonia and motor asthenia are two different phenomena and two concepts to be kept quite distinct, especially in so far as hypotonia and hypokinesia of nervous origin are concerned, since those cases that depend upon hereditary or acquired changes of the trophism of the muscular cells of the stomach deserve separate consideration.

Coming to constitutional anomalies of the intestine, we find here (in addition to tendencies that are somewhat analogous to those of the stomach with regard to the various conditions of the neuromuscular tonus of the wall, of the peristaltic activity and secretion, the varying sensibility and the anomalies of situation) certain other very important variations which concern the power of absorption and assimilation of products of digestion, and possibly also the protective power of the intestinal wall against exogenous poisons. We know that certain individuals (mostly megalosplanchnics) have a long, large intestine which makes the greatest possible use of the chyme arriving from the stomach, so that it leaves only a small, dry and fully formed residuum of fecal matter, a condition of no little importance in the production of habitual constipation. Other individuals, on the other hand (hypoplastic microsplanchnics) have a short, small intestine, which makes only partial use of the alimentary materials, so that a part of these is subject to decomposition by the bacterial flora in the large intestine, or to elimination in the form of copious bovine or semifluid feces. The nutritive and assimilative power of the individual depends more upon the constitutional strength of the intestine (and its accessory glands) than upon the stomach.

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[1] Accordingly, the treatment of these states of vagal hypotonia of the stomach and bowels with injections of cholin chloride Merck (0.6 gm.) has been found very useful.

On the other hand, the very large surface of the intestinal mucosa, with its many exocrine glands and its extensive reticulated and agminated lymphatic tissue (we may mention also the enterochromaffin gland of Ciaccio), is, like the skin, an excellent mirror of the humoral balance of the organism, and this explains why we so often find intestinal disturbances in subjects with exudative, lymphatic, neuro-arthritic or vagotonic diathesis, disturbances that consist for the most part of paroxysmal phenomena, often resembling anaphylactic crises, or attacks of intestinal dystonia (localized spasms, circumscribed dilatations), dyskinesia (a paroxysmal hyperperistalsis and intestinal colics), or abnormal secretion (serous diarrheas, a kind of Quincke's edema of the intestinal wall, mucous and mucomembranous colics and eosinophile rectal catarrhs). All these phenomena have a predilection for the large intestine, which is under the excito-secretory and excito-motor influence of the sacral parasympathetic nerves and the parasympathicotonic hormones. Moreover, this portion of the intestine, as Audrain has shown, abounds particularly in reticular and follicular lymphatic tissue, and hence takes an active part in the characteristic reactions of this tissue; and since the appendix is composed chiefly of lymphatic tissue, and this kind of tissue and abundant lymphatic vessels also surround the hemorrhoidal venous plexuses, as Quénu and Gerota have shown, we can understand how lymphatic-arthritic-exudative subjects show a singular tendency to reactions of the appendix when this contains an exaggerated amount of lymphatic tissue, and that such an appendix, like hypertrophic tonsils, is easily subject to recurrent inflammations owing to the bacteria that are present in its lumen or that are circulating in the blood stream.

According to the results of the experiments of C. Richet, Jr., the appendix has the important task of eliminating microbes and toxins, but, exactly as occurs in the case of the tonsils, the organ easily succumbs in this antibacterial and antitoxic struggle, which becomes more intense the more hyperplastic is the lymphatic tissue of the appendix. Moreover, according to Miloslavich, the hypertrophic lymphatic tissue of the canal of the appendix invades and atrophies the muscular tunic of the latter, thus limiting its contractions and hindering the emptying of fecal residues or foreign bodies contained in it. Added to this is the fact that in lymphatics still other anomalies of the appendix have been found, such as an excessive length or a funnel-shaped form, the latter being a stigma of hypoevolutism or appendicular infantilism. In arthritics certain French authors have noted a tendency to the formation of gravel and intestinal calculi which may irritate or obstruct the appendix. Finally, in the aforesaid diatheses there exist the same thickening and the same consequent fibroplastic diathesis of the walls of the cecum that lead to cecal hypokinesia and atonia, a twofold cause contributing to the inflammatory condition of the appendix. Miloslavich thinks that a simple swelling of the lymphatic tissue of the appendix may provoke a syndrome of acute or chronic appendicitis. Given the relationship between the lymphatic tissue and the endocrine system, we can also readily understand how a special appendicular irritability may be encountered in certain endocrinopathic constitutions.

Also with regard to the tendency to hemorrhoidal disturbances, Audrain thinks there is a type of compression which may be exercised upon the hemorrhoidal veins by the surrounding connective-lymphatic tissue, which is especially abundant and irritable in lymphatic-arthritic constitutions. This explanation seems to be valid for a much larger number of cases than that which seeks to account for the origin of hemorrhoids by assuming a certain degree of portal stasis, due to the hepatic engorgement characteristic of arthritic and enteroptotic subjects (page 184). We must probably also seek in the abundance of lymphatic tissue in the intestinal mucosa, and especially in its insufficient capacity for defense, the reason for the predisposition in certain subjects, particularly those of microsplanchnic constitution, to typhoid fever and intestinal tuberculosis. In addition, the fact has been generally noted that certain subjects, even adults, carry more frequently than others in their intestine various helminths (tapeworms, ascarides, oxyurides and trichocephali). In certain regions where helminthiasis is very common (province of Messina) I have found this predisposition to be more frequent in microsplanchnic constitutions. Also among children, who are so much more predisposed than adults to ascaris and oxyuris, we find marked differences in receptivity to these intestinal parasites.

The intestinal flora also varies from individual to individual.

Some persons, independently of alimentation, have in place of the habitual predominance of Gram-negative microbes a predominance of Gram-positive microörganisms and leptothrices. We find this particularly in neuropathic achylic or hypochlorhydric individuals and in dyspeptics who are subject to flatulence and diarrhea. Putrid intestinal dyspepsia is related to this Gram-positive flora, and is combined with another intestinal anomaly that has been closely studied by Ad. Schmidt, namely, the insufficient fermentative action of the walls of the colon upon the alimentary cellulose by reason of which the latter, not being dissolved and utilized, easily falls a prey to the flora of fermentation. The quantity and form of the feces and the activity of the colic peristalsis depend principally upon this more or less perfect or imperfect process of utilization of the cellulose on the part of the intestinal wall. In chronic constipation the cellulose is digested and absorbed, the utilization of the nutriment is at maximum, so that the fecal residue is small and not sufficient to stimulate peristalsis. As we have seen, the reverse is true in other subjects in whom the cellulose cannot be digested and consequently ferments through the action of a special intestinal flora particularly abundant in these subjects, and thus we have contractile hyperstimulation of the colon, resulting in diarrhea.

Now, according to the observations of Eppinger and Hess, the individuals of the former type belong in the category of vagotonics. In these, as contributory elements to the genesis of habitual constipation, there are other effects of intestinal vagotonia as well, such as hypertonia of the colon, which limits its peristalsis, localized spasms with dilatations in the upper segment, and also frequently mechanical obstacles to the progress of the fecal mass, created by anomalies of position of the colon and by adhesions and abnormal folds of the peritoneum.

These anomalies of position of the colon, especially of certain tracts of it, represent, as we know, one of the more common and clinically one of the most interesting signs of that constitutional anomaly of the intestines which goes under the name of *enteroptosis*, and which is in its turn coördinated with a general bodily type, the *atonic* or *ptotic habitus* (Stiler). We may mention movable cecum, with or without *typhlomegaly*, and serious ptosis of the transverse colon, with the disposition of the ascending colon to assume the form of the double barrel of a gun, with or without *dolichocolia* (excessively long colon), an anomaly that is frequently responsible for chronic constipation and chronic pseudo-gastric or pseudo-appendicitic or pseudo-cholecystitic syndromes, as the recent excellent observations of Taddei have shown. And, finally, we may recall the anomaly of pericolic membranes, particularly Lane's membrane, which goes from the posterior wall of the abdomen to the lateral or median wall of the ascending colon, of the colon and cecum, of the cecum alone, or of the angle between the ascending and the transverse colon (Taddei).

When enteroptosis is of advanced degree it not only produces a disposition to the various gastro-intestinal dyspepsias which depend chiefly on the state of excitability of the individual's vegetative nervous system, and which are modified as this becomes modified (many surgical operations for splanchnoptosis acting in this direction), but also exercises an especially great influence upon the respiratory and circulatory functions. The lack of support for the diaphragm, during its contraction, upon the intestine, and its consequent depression, the diaphragmatic hypotonia and hyposthenia of which A. Signorelli has made a careful study, and which constitute part of the general dolichomorphic asthenic constitution, result in almost complete suppression of the diaphragmatic lower costal respiration. The subject in that case forces into use the auxiliary inspiratory muscles which lift the upper half of the thorax, and breathes chiefly with this half, which dilates like a barrel while the head sinks between the shoulders and the base of the thorax is restricted. We thus have the *pyriform thorax* of Wenckebach. On the other hand, the intra-abdominal blood, not being subjected to the normal inspiratory pressure, accumulates in the abdominal viscera, especially in the liver, and we have as a result the characteristic ischemia of the upper half of the body observed in enteroptotic subjects, the facial pallor, the ready syncope, the tendency to hemorrhoidal, uterine and renal stasis. Similar consequences may, of course, follow an acquired enteroptosis, such as is found in asthenic women as the result of repeated pregnancies.

We must now glance at the constitutional anomalies of the three principal glands accessory to the digestive apparatus—the liver, pancreas and spleen—giving special attention to functional anomalies and morbid predispositions of these organs.

It was already known to the ancients that certain individuals have the characteristics of the so-called *bilious temperament*, which has been analyzed in modern times, especially by the French clinicians. Gilbert has designated as *familial simple cholemia* that hereditary anomaly of the bile-producing and bile-secreting function of the liver in which a quantity of bilirubin in excess of the very minute amount that circulates in normal individuals enters physiologically into the blood and causes a kind of cholemia, a minimal physiological icterus, a constitutional hyperbilirubinemia, which is the principal sign of the *bilious constitution* or of the *hepatic soil.* These subjects are said to be, in fact, predisposed to all hepatic diseases, especially to gall stones, infectious icterus, cirrhosis, primary cancer of the liver and even echinococcus. They can be recognized by their olive, or brownish-yellow, or livid, pale complexion, abounding in pigmentary and vascular moles and in coffee-colored spots known as liver spots, and by the presence of xanthoma on the eyelids, due to an accumulation of the excess cholesterin circulating in the blood (hypercholesterinemia following hepatic insufficiency). They are easily disposed to melanoderma under the influence of light and other irritating stimuli. They often present, in addition, bradycardia, arterial hypotension, hypothermia, hypersensitivity to cold, asthenia, apathy, psychic depression and irritability, psychasthenia, hypochondria, somnolence after eating, constipation interrupted by attacks of hyperperistalsis, hemorrhoids and epistaxis. Epilepsy, too, has been observed among these subjects, as I also can confirm. Occasionally there is a complex of these symptoms and characters which closely approaches that of constitutional hypoadrenalism. Arthritic symptoms may also be found mingled with the preceding, such as migraine, urticaria, recurrent rheumatism and eczema, hypoazoturia or hyperazoturia, highly colored urine and alimentary glycosuria.

As regards the physical habitus, we find megalosplanchnic and microsplanchnic types, but principally the latter, of hyperthyroid or hyperthyroid-hypoadrenal variety. These subjects are often descendants of gouty or diabetic individuals, and not infrequently show a marked predisposition to pulmonary tuberculosis. As to the genesis of this constitutional hyperbilirubinemia, we cannot assume a simple disturbance of the biliary canalization due to anomalies of the bile ducts or of the lymphatics and blood capillaries of the liver, but must assume an insufficient functioning of the hepatic cell, which does not succeed in conveying all the bile pigment into the small bile ducts.

Now this functional insufficiency of the hepatic cell reveals itself in these individuals in still another manner, first of all by the tendency of the bile to form precipitates and concretions—a tendency which must be essentially related to dysbiligenesis, to a qualitative alteration of the bile and, especially, to a large cholesterin content (Aschoff and Bacmeister, Flandin, Defaye, Aoyama, etc.) as compared with a relative deficiency of substances secreted by the same hepatic cells (and perhaps also by the cells of the mucosa of the bile ducts and gall-bladder), whose function is to keep the cholesterin dissolved. Among substances that facilitate such solubility we are acquainted only with the salts of the biliary acids.

Grigaut and Chauffard also assume an incapacity on the part of the hepatic cell to transform the cholesterin of the blood and to eliminate it in the bile as a chemically related cholalic acid (Chauffard's *cholaligenous insufficiency*). The excess of cholesterin in the bile would thus seem to be related on the one hand to hypercholesterinemia, and on the other to hepatic insufficiency. If mechanical factors of stasis in the ducts and gall-bladder or catarrhal conditions of these are also present, which furnish mucus and bacteria as a nucleus for cholesterin precipitation, calculi are formed.

Now Chauffard, Grigaut and others have shown that *constitutional hypercholesterinemia*, the *cholesterin diathesis*, which is for the most part hereditary, is found in individuals of the great arthritic family, to which also belong individuals who present biliary lithiasis; and since cholesterin metabolism is governed by certain endocrine tissues, such as the adrenal cortex, the corpus luteum, the interstitial glands, the thymus, the anterior lobe of the hypophysis, it is readily understood how certain endocrine temperaments (dysthyroidism, according to Lévi and Rothschild) may show a special disposition to gall stones, but the details of such a relationship need to be worked out by systematic research.[1]

A third manifestation of constitutional hepatic anomaly is the predisposition to so-called chronic *acholuric* or *hemolytic icterus*, both in the strictly congenital and familial form and also in the so-called acquired form in which Ceconi has very often been able to show a familial character that has escaped recognition. We do not fully understand what part the liver plays in this syndrome of essentially endogenous origin, but the hypothesis that seems the most acceptable today is that which regards hemolytic icterus as a systemic disease of the spleen and liver, in which there exists a special dysfunction of those splenic and hepatic elements (cells of the reticulo-endothelial apparatus?) upon which devolves the regulation of normal hemolysis and the subsequent formation of bile pigment on the part of the hemoglobin of the disintegrated red cells.

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[1] A clinical fact that I have remarked in many cases is the coëxistence of hypercholesterinemia with hyperglycemia and hypercalcemia.

According to R. Bauer, one stigma of constitutional hepatic inadequacy, and, more precisely, of imbalance of the hepatic innervation (Pollitzer), consists of alimentary galactosuria, which is frequently found in asthenic, enteroptotic, hyperthyroid and neurasthenic subjects. According to Strauss, another important stigma is *lordotic urobilinogenuria*. The modern investigations of Widal and his school also find a sign of hepatic insufficiency in the appearance of hemoclastic crises and of protein shock during the digestion of proteins, due to the entrance into the circulation of heterogenous proteins which are not homogenized and not held in check by either the intestinal barrier or the hepatic parenchyma. This seems to occur particularly in individuals with exudative and arthritic diathesis, and, together with the same functional anomaly of the intestinal wall, to be responsible for the subject's tendency to alimentary anaphylaxis.

The importance of the liver as a protective organ[1] against intoxications of alimentary origin is undeniable, and it is an outstanding fact that these subjects in whom we have reason to suspect an hereditary and familial hepatic weakness are precisely the ones in whom we observe with special frequency the various idiosyncrasies to medicine and food and the tendency to anaphylactic disturbances. In some of these cases the hepatic inadequacy seems to us to be coördinated with constitutional anomalies of certain endocrine glands, such as the thyroid, thymus, parathyroids, adrenals and ovary, which explains how idiosyncrasy and anaphylaxis have a predilection for subjects with unstable thyroid and ovary (L. Lévi), and for thymico-lymphatic and hypoadrenal subjects.

Other constitutional anomalies of the hepatic parenchyma that we must assume *a priori* even though we can form no clear idea of them, are those which evidently exist in uricemia, in disturbances of carbohydrate metabolism (diabetes) and of lipoid and fat metabolism (obesity). Here also we believe today that the anomaly of hepatic function is coördinated with anomalies of the endocrine system.

Finally, certain facts demonstrate what an important part certain anomalies of the liver must play in the genesis of apparently exogenous hepatic diseases, such as catarrhal icterus and cirrhosis. In catarrhal icterus Eppinger has found that the walls of the common duct are abnormally rich in lymphoid follicles, which, because of their readiness to swell, obstruct its lumen in cases where there is irritation or slight inflammation of the mucosa. Also for cases of so-called spasmodic and emotional icterus Eppinger and Hess assume a constitutional vagotonia, which gives a liability to spasm of the common duct of vagal origin. We must also assume a special hyperexcitability of the sensory and motor nervous system of the gall-bladder and the bile ducts, to account for the fact that in only 5 per cent of subjects presenting hepatic lithiasis are there any disturbances revealed clinically (Rieder).

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[1] Recently there has also been extracted from the liver a hormone having hypotensive action, which is believed to facilitate oxidation of the hypertensive amino-acids derived from the intermediate metabolism of protein, the retention of which would cause hypertension.

In hepatic cirrhosis, especially in the early or juvenile type described by Neusser and Flekseder, there must exist an hepatic abiotrophy or a special imbalance of its connective tissue, owing to which the organ ages easily. In such individuals we frequently find signs of the hypoplastic constitution, atrophic thyroid and genital glands, vascular hypoplasia, status lymphaticus, chloroticus or thymico-lymphaticus, infantilism (Chwostek), and gynecomastia.

In connection with constitutional anomalies of the pancreas, the French speak of a *pancreatic family* in order to explain the predisposition in several members of the same family to calculosis of the pancreas, to acute and chronic pancreatitis and to diabetes. It is important to observe that in cases of gastric achylia the pancreatic juice also may show a lack of certain ferments (Einhorn).

But, most of all, the absolutely endogenous nature of diabetes, of which we can form no conception today without positing an hereditary or acquired insufficiency of the pancreas, compels us to assume the existence of a *constitutional pancreatic inadequacy* with a tendency of the pancreas to atrophy, to sclerosis of vascular or canalicular origin, to degeneration of Langerhans' islands and of the acini, under the influence of either the alimentary *surménage* or the diathesis of enterogenous autoinfection of certain subjects (which easily leads to chronic infection of Wirsung's duct), or the fibrous diathesis of arthritics, or, most of all, the vegetative nervous diathesis, related, in its turn, to the state of constitutional imbalance of the endocrine system, since we know the influence of certain hormones, such as the thyroid, neuro-hypophyseal and chromaffin—antagonistic to that of the pancreas—upon the tolerance for carbohydrates and the utilization of glucose.

Thus in the vast majority of cases the pancreatic anomaly forms a part of the picture in the endocrino-sympathetic diathesis, which we shall take up farther on.

Constitutional anomalies of the spleen, which seems today to be so closely bound to the liver in its physiology and pathology, can be deduced from the familial form of certain morbid conditions studied of recent years: Gaucher's *splenomegaly*, *familial-hemolytic splenomegaly*, Vaquez's *erythremic splenomegaly*, *simple constitutional splenomegaly* (in lymphatic, infantile and exudative subjects), Hirschfeld's *idiopathic leukopenic splenomegaly* and Banti's *splenomegaly*, to which we may add the singular disposition of the spleen, in several members of the same family, to a lymphadenoid or myelo-adenoid, leukemic, hyperplastic process a disposition which some authors (Neusser, Herz, Hedinger) would identify with Bartel's status lymphaticus and hypoplasticus.

CHAPTER VII.

CONSTITUTIONAL ANOMALIES AND INADEQUACIES OF THE UROGENITAL APPARATUS.

Constitutional albuminuria a degenerative stigma—Renal glycosuria without hyperglycemia—Anomaly of threshold of water elimination—Diabetes insipidus—Constitutional oliguria and polyuria—Lithic diathesis—Relation to hormones—Hereditary congenital renal inadequacy—Renal abiotrophy—Juvenile contracted kidney—Constitutional anomalies of the genital apparatus—Primary hypogenital type—Eunuchoidism—Incomplete and dissociated forms—Association with heterosexual tendencies—Dissociation of sexual instinct from function of internal genital secretion in certain hyperthyroid subjects—Evolutive anomalies of uterus and adnexa—Fecundity and constitution—Tumors due to constitutional imbalance of the endocrine system—Pure hypergenital type—Its association with hypothyroidism—Precocious matronism.

We shall pass rapidly over the comparatively common malformations of the urinary apparatus, which have relatively little clinical value, and of which those of most practical importance are the congenital ectopic kidney, the congenital polycystic kidney and anomalies of the ureter (kinking, folds of the mucosa, abnormal insertions) which predispose to hydronephrosis and pyonephrosis.

Of greater interest is the recent demonstration of a series of functional anomalies involving more particularly now one and now another partial function of the renal parenchyma, and also the demonstration of a distinct hereditary and familial predisposition of the kidney to become the victim of inflammatory, degenerative, abiotrophic or arteriosclerotic processes.

One of these universally recognized anomalies is the so-called constitutional or physiological albuminuria. It consists of the ready appearance in certain individuals of a small quantity of albumin in the urine (always more, however, than the smallest trace present in normal urine), owing to causes which in the majority of normal subjects do not produce this phenomenon. Some have albuminuria after an emotional upset, others after a cold bath, still others after rather strenuous muscular exercise, or a heavy meal, or intense mental work, or masturbation, etc. Two forms, however, of this so-called functional albuminuria are especially interesting, namely, the cyclic, or intermittent form, and the lordotic, or orthostatic form, both of which have a predilection for puberty, after which they may disappear, or may be prolonged for many years up to maturity, without any nephritic manifestations arising for twenty-five to thirty years; in a small number of cases symptoms of chronic nephritis or of contracted kidney slowly replace constitutional albuminuria (Senator, Iehle, Pollitzer, Nassau). We do not wholly understand the pathogenetic factors by virtue of which albumin appears only at certain hours of the day, or only on certain days, or only when the subject is in the upright position, but the dominant factor seems to be an easy vasomotor or circulatory variation which takes place in the kidney of certain subjects who are predisposed to it by a constitutional permeability of the renal filter to the albumin of the blood (especially in the left kidney, owing to the special course of its emulgent vein, according to Kelling); or the albuminuria may be due to various conditions, especially to the erect position which makes the venous outflow from the kidney more difficult, or to a dorso-lumbar lordosis, which, as Iehle has shown, is the mechanical factor most frequently present, for it is possible to cause the appearance of albuminuria by provoking an artificial lordosis in children. But since lordosis does not always exist in cases of orthostatic albuminuria, and since in cases in which there exists even a serious dorso-lumbar lordosis (that due to progressive muscular atrophy, for example) there may be no albuminuria if the kidney is not predisposed to this, we have to assume that the essential pathogenetic condition of this orthotic or lordotic albuminuria is a complex of constitutional anomalies which concerns both the renal parenchyma and also its innervation and circulation.

The not infrequent coëxistence of constitutional albuminuria and of symptoms of functional insufficiency of the kidney (demonstrated by Barker, Smith and Hess by means of the phenolsulphonephthalein and lactose tests) seems to support the hypothesis of an autochthonous anomaly of the renal epithelium, as does also, in a special degree, the observation that in the families of constitutional albuminuric subjects we often find that *congenital renal weakness* of Castaigne and Rathéry which reveals itself by the tendency to nephritis and to various forms of renal lithiasis. The coëxistence of oxaluria and of Iehle's *hemoglobinuria from marching* has also been observed.

The hypothesis of an anomaly of the renal vascularization receives support from the important fact that hypoplasia of the renal arteries (Teissier) and of the arterial system in general is frequent, resulting in a more ready stasis in the renal circulation, due to factors that hinder the venous outflow. To explain the anomaly of the kidney innervation in these subjects all students point out the instability of the vasomotor tonus and the renal vascular hyperreflexism, coördinated with a state of general vegetative nervous imbalance. In these orthostatic albuminuric subjects Pollitzer assumes the existence of an orthostatic sympathicotonic vascular renal reflex, and of a clinostatic vagotonic renal reflex, the first favoring and the second inhibiting the development of albuminuria.

On the other hand, although no constant relation exists between constitutional albuminuria and the patient's general type of constitution (Fischel and Popper), it is undeniable that in the majority of cases we find a special *habitus* and numerous degenerative stigmata, which tell us that the anomaly is not localized in the kidney but involves the whole organism. Iehle, basing his theory on the presence of static dorso-lumbar lordosis, due to exaggerated growth in length of this section of the spinal column, and to deficient energy of its muscles and ligaments, interprets this condition of weakened capacity for maintaining an erect position as a stigma of ontogenetic and phylogenetic hypoevolutism, because it is physiological in infants (and to a certain degree in women), and also in the inferior human races and in anthropoid apes. These albuminuric individualities rather frequently present the bodily characteristics to which we have called attention in connection with narrowness of the aorta, status thymico-lymphaticus and status hypoplasticus, namely, pallid, livid coloring, sometimes with a slight cyanotic flushing of the face, acrocyanosis of the hands and *livedo* of the arms and legs, a pasty consistency of the skin, large, bright eyes with circles around them, and with long lashes (Pollitzer); atonic and asthenic constitution; signs of lymphatism or of exudative diathesis, or of enteroptosis; a shambling gait, a pendulous, lordotic abdomen; a tendency to syncope, vertigo, palpitation of the heart and headache; hypotension and marked variations in the pulse-rate and in blood-pressure on passing from the recumbent to the erect position, *pulsus inspiratione intermittens*, ready dilatation of the heart after effort, puberal disturbances of the heart, great instability of the vegetative nervous system, occasional vagotonia (v. Dziembowski), marked reactivity to adrenalin, pilocarpine and atropine; apathy and slowness in children (Heubner), nervousness and psychic anomalies (schizothymia, for example) in adults, hypoevolutism of the blood (see above), constipation, oxaluria, diminished coagulability of the blood, epistaxis, hematuria and essential hemoglobinuria.

This constitutional albuminuria may be accompanied by cylindruria, epitheliuria, the presence of scattered erythrocytes and leukocytes in the urine (Meyer, Nassau, Iehle, etc.), with diminished elimination of urea, chlorides, water and lactose that has been experimentally administered, which shows that the trophic and functional disturbance of the kidney is not so slight as we might *a priori* suppose from the fact that albuminuria may exist many years with an apparent anatomical integrity of the renal tissue.

A second congenital functional anomaly of the kidneys is the renal glycosuria, often hereditary and familial, of young individuals who may for many years eliminate a small quantity of sugar with the urine without hyperglycemia, derangement of carbohydrate metabolism or other symptoms of diabetes, and without any strict relation between glycosuria and the form of diet. We are dealing in these cases with an exaggerated secretory function of the renal epithelium for sugar, which may be due to a primary renal anomaly (except in cases of anatomical lesion of the kidney), or may be secondary to an anomaly of the innervation that regulates the threshold of glucose elimination from the kidney. Such anomalous innervation is shown by the increase of renal glycosuria following an emotional state, according to Raimann; the results of recent investigations of my own point to renal vagotonia, often associated with symptoms of dyspituitarism.

It is interesting to find that in some cases this renal glycosuria without hyperglycemia may be combined with a true diabetes mellitus or may be transformed into the latter; that the two syndromes may be associated in the same family and may alternate; or, finally, that together with the syndrome of renal diabetes without hyperglycemia there may also exist signs of true diabetes, such as emaciation, impotence, ischialgia and furunculosis, as in two cases that I have published. There are, on the other hand, individuals in whom the kidney is little permeable to the sugar in the blood, even when this rises above the average. This explains how a true diabetes with hyperglycemia may simulate diabetes insipidus and how glycosuria may not correspond at all to the blood-sugar index.

A third constitutional anomaly of the kidney concerns the threshold of water elimination and the power of eliminating the urine at a given concentration. Veil has shown how many individual differences exist in the behavior of the kidney after the administration of a large quantity of water. In reality it is not the renal function alone that is in question, but also the avidity of the tissues for water and the varying tenacity with which water combines with the tissues themselves.

Now there are individuals in whom the kidney, even though it be anatomically healthy (in appearance, at least) responds with an exaggerated water elimination to physiological stimuli of diuresis, which are represented by solid substances dissolved in the urine, especially by chlorides; that is, the kidney is incapable of eliminating these substances except in very high dilution, and is unable to concentrate the urine to the same degree as the normal kidney. Such insufficient power of concentration, demonstrated by E. Meyer, characterizes the so-called diabetes insipidus of *primary renal origin* or *renal diabetes insipidus,* as we may call it in contradistinction from renal diabetes mellitus, which we have already examined.

If we administer to these subjects 20 gm. sodium chloride a conspicuous diuresis is observed, and the salt is slowly eliminated over a period of several days, a little at a time, each such elimination requiring a large outflow of water from the kidney. In this respect this renal diabetes insipidus shows, as we see, an apparent analogy with contracted kidney, and it is interesting to note that sometimes at autopsy in such cases doubt has remained whether they were not really cases of interstitial nephritis (Saundby), so that these two syndromes are easily mistaken for one another. Meyer has proposed the following identification test: Theocine plus sodium acetate increases the renal permeability, and when this is reduced for solids, as occurs in interstitial nephritis, the drug facilitating their excretion does not cause the kidney to require a further dilution of the urine, so that, although theocine is a diuretic, it somewhat augments the concentration of the urine, without increasing polyuria. In renal diabetes insipidus, on the contrary, by increasing the excretion of solids polyuria is even more increased.

Now this form of diabetes insipidus has often been found in several members of the same family (Weil) and may (if the ingestion of fluids is not unreasonably limited) be compatible with good health throughout life, so that, instead of being a real disease, it appears to indicate a special manner of renal functioning with regard to the elimination of water.

In contrast with this there is another form of diabetes insipidus in which the *primum movens* is the lowering of the threshold of water elimination, owing to a primary disturbance of the nerve centers which regulate this threshold centers situated in the hypothalamus and in the regions of the tuber cinereum, as shown by the modern investigations of Karplus and Kreidl, Camus and Roussy, Aschner, Bernhard, Houssay, Leschke, Frey, Bulcke and Wels, Asher, Oshima, Bailey and Brehmer, etc. Since Jungmann and E. Meyer, by their original experiments in rabbits, have shown that puncture of the fourth ventricle (in which the pathways from the aforesaid mesencephalic centers probably pass) may produce polyuria (with or without hyperchloruria), we see well demonstrated today the direct influence of the nervous system on the renal cells as regards the threshold of water elimination. In this primary nervous diabetes insipidus the capacity of concentration for chlorides is normal (Aubertin and Ambard, Bergé and Schulmann, Oehme, Marañon). In this way we can understand the paroxysmal nervous and emotional polyuria (spastic urine) so frequently found in certain subjects with unstable and irritable vegetative nervous systems. It is not well ascertained whether in these cases polyuria is of vagotonic origin, as Motzfeldt, Stierlin and Verriotis assume, or of sympathicotonic origin, as the existence of adrenalin polyuria would suggest.

There is a third type of diabetes insipidus approaching this diabetes insipidus of primarily nervous origin, one that can be linked up with a primary insufficiency of the neuro-hypophysis. This gland is undoubtedly capable by itself alone of producing polyuria (Marañon), although everything leads us to believe what I have for long years maintained and what is today accepted by many authors (E. Meyer, Flekseder, Eisner, Motzfeldt, Bergé and Schulmann, Marañon, etc.), namely, that the neuro-hypophyseal secretion may act upon the renal threshold for water (not, as many assume, on the power of concentration of the kidney) by stimulating the nearby encephalic and intrinsic renal centers (Motzfeldt) that regulate diuresis.

Accordingly a constitutional posterior hypopituitarism, which is not infrequently associated with a certain degree of general infantilism, may account for certain forms of diabetes insipidus, which, as I have seen in a recent case, may appear to be congenital and may reveal themselves even in the first year of life.

By virtue of the law of errors and antitheses we find in certain individuals also a functional anomaly of the kidney of a directly opposite nature to that found in diabetes insipidus, namely, a *constitutional oliguria,* with or without increase of urinary concentration. It is startling in these cases to observe the persistent scarcity of urine, notwithstanding the sufficient ingestion of fluids, without injury to health; oliguria may appear without any other symptoms after an acute nephritis and may persist for several months without any increase in body weight, that is, without water retention in the organism. Evidently in these cases the elimination of water is accomplished by the skin, lungs and intestine.

We must now touch briefly upon another very common constitutional renal anomaly, the tendency to the formation of concretions, the *lithic diathesis,* which, as we know, is one of the most important manifestations of arthritism, and which may really be regarded as an hereditary anomaly of metabolism rather than an anomaly of the renal function. Nevertheless, certain facts show that the renal anomaly also participates directly in the genesis of lithiasis. Adler has pointed out the frequency of nephrolithiasis in families in which we find other signs of constitutional weakness of the urinary apparatus (nephritis, nocturnal enuresis). It is not rare to find nephrolithiasis in the same kidney in several members of the same family. Moreover, modern views on the pathogenesis of urinary calculi, while giving due consideration to the increased elimination of certain substances of which the calculi are formed (urates, oxalates, phosphates) as the result of an anomaly in their metabolism, also attribute great importance to the deficient secretion on the part of the renal cell of colloid substances, whose allotted task is that of keeping such calculous substances dissolved in the urine in strong concentration (the *Schützcolloide* of Lichtwitz).

We know, in fact, that large quantities of urates, oxalates and phosphates can be eliminated in the urine for a long time without the formation of calculi.

As for the constitutional anomaly of metabolism that lies at the bottom of uratic calculosis, we know that it consists in uricemia, owing to which we often find gout and uric calculosis associated in the same family or in the same individual.

Closely related to the uric acid diathesis and to purin metabolism (Pincussohn) is the oxalic acid diathesis which leads to oxaluria and oxalic lithiasis, so often combined or alternating with uric lithiasis in the same family or the same individual. A contributory factor in this oxaluria is the increased resorption on the part of the intestine of the oxalic acid of the food (usually little absorbable) when there is an excess of hydrochloric acid in the stomach. But a still more important factor, especially for the precipitation of oxalic acid in the urine, is *calcariuria*, the increased elimination of blood calcium through the urine as compared with its elimination by the intestine. This *calcariuria* and the intestinal hypoelimination of calcium, which may reveal itself in a familial form (v. Domarus), may, according to some authors (Klemperer), be attributable to a renal calciotropism, an increased avidity of the renal cell for the blood calcium, that is, to a constitutional anomaly *sui generis* of the renal cell. According to others it is due to a diminished permeability of the intestine for calcium; both anomalies may be under the influence of the nervous system. Calcariuria favors not only oxaluria and oxalaturia but also phosphaturia, which is almost always definitely due to increased elimination of calcium in the urine (Sendtner).

The frequency of phosphaturia and oxalaturia in certain states of irritable weakness of the vegetative nervous system, for example, in asthenics and vagotonics (Eppinger and Hess), suggests an intimate relationship between these anomalies and anomalies of the neuro-vegetative tonus, whether the case is one of altered nervous influence upon the renal cell or one where the nervous influence upon the humoral balance has been subjected to changes.

It is possible by an imbalance between the tonus of the parasympathetic and sympathetic nerves which regulate the emission of urine from the bladder, and by anomalies of the vesical muscles themselves (atonia, spasmophilia) to explain certain anomalies of urination: in some subjects pollakiuria, strangury, dripping after urination (according to Eppinger and Hess these disturbances are frequent in vagotonics); vesical hyperexcitability and enuresis, which has been compared to a form of vesical hypoevolutism, the persistence of an infantile character (in certain cases of enuresis a lumbo-sacral myelodysplasia and an abnormal dilatation of the so-called terminal ventricle exist).

We must also recall that certain hormones probably have a close connection with the metabolism and with the elimination of uric and phosphoric acid and of calcium. Thus, the neuro-hypophysis increases the uric acid of the blood and the elimination of this by the kidneys just as adrenalin does; the thyroid increases the elimination of phosphorus and calcium through the feces, so that we may suppose that certain endocrine temperaments are more predisposed to the aforesaid renal anomalies. Among individuals predisposed to lithiasis the characteristic habitus in uraturics and oxalaturics, in whom the arthritic megalosplanchnic constitution is dominant, differs from that in phosphaturic subjects, in whom the asthenic microsplanchnic constitution, and often its hyperthyroid variety, is dominant.

We have yet to mention the hereditary predisposition to nephritis, that is, to say, to the more important manifestations of *familial hereditary congenital renal inadequacy.* There is no physician who does not know some example of a family in which several members have very easily contracted acute nephritis even through slight infections (anginas) or from taking cold, or have suffered with nephrosis as a result of medicamentous intoxications, chloroform narcosis, etc.

According to Kollert and Bauer, the habitus of subjects possessing these renal weaknesses is mostly of the heavy or megalosplanchnic type. The predominantly endogenous nature of contracted kidney is even more apparent. When this attacks youthful individuals, in the form of primary renal atrophy, it is legitimate to assume with Strümpell that we are dealing with a true *renal abiotrophy*, a ready and premature exhaustion of a constitutionally hypoplastic or miopragic kidney, which wears out even in the exercise of its normal physiological work, but does so with especial ease if the individual exposes this weak kidney to effort (dietetic abuses, exaggerated elimination of endogenous or exogenous poisons), as occurs chiefly in arthritic subjects, heavy eaters and in persons suffering from chronic autointoxication due to alimentary poisons or faulty metabolism.

Various authors have shown in the juvenile contracted kidney a hypoplasia of the renal arteries, which, besides being narrow, easily undergo, like all hypoplastic arteries, premature sclerosis, and hence, easy cirrhotic atrophy of the kidney, without the intervention of inflammatory processes, although these too may easily fasten upon ill-nourished kidneys of this type. Apart from their muscular megalosplanchnic habitus, these young subjects with primary contracted kidney are occasionally characterized by a certain degree of hypogenesis of hair and of the genital organs, by pallid, chloranemic coloring and symptoms of aortic hypoplasia. Sometimes the first symptoms of this renal atrophy, which are extraordinarily attenuated and of extremely slow course, may even be observed very soon after birth, and it is not a rare thing to see this disease in a familial form. But even the contracted kidney that attacks adults, as the result of a renal localization of Gull-Sutton's generalized sclerosis of the arterioles, or of arterio-capillary fibrosis or secondary chronic tubular nephritis, has a predilection for megalosplanchnic and athletic constitutions and for individuals with lymphatism and arterial hypoplasia. From my own observations I find a great frequency of chronic nephritis in megalosplanchnics of hypothyroid variety, which is well explained by the fibrous diathesis, premature arteriosclerosis and early aging of the organs in individuals with an insufficient thyroid.

Coming now to constitutional anomalies of the genital apparatus, we may say that variants of slight degree are rather frequent, especially partial variants in the field of function; they are considerably more frequent in the female than in the male, since the former is, as Mathes says, almost physiologically disposed to conditions of general infantilism, of which sexual hypoevolutism is the most characteristic side.

We have referred several times to sexual hypoplasia in status thymico-lymphaticus and in certain varieties of the megalosplanchnic and microsplanchnic constitutions. As a general rule, we may say that our two fundamental morphological ectypes in their extreme variants (extreme microsplanchny and extreme megalosplanchny) are very frequently found associated with hypogenitalism (Viola), while in variants of medium degree microsplanchnics have a tendency to hypogenitalism and megalosplanchnics to hypergenitalism.

There exists also a *primary hypogenital* type, the so-called eunuchoid type, which is especially characterized by the exaggerated length of the lower extremities, of the legs as compared with the trunk and head, which are relatively hypoplastic; by the stature, which is somewhat higher than the average, by deficient development, in variable degree, of the genital organs and of somatic and psychic puberal sexual characteristics. This strictly microsplanchnic type is met with relatively often, in males as well as in females, especially at puberty; during the following years it may be somewhat corrected, but it always remains recognizable on account of the disproportionate length of the lower extremities (puberal eunuchoidism). We can no longer doubt that eunuchoidism may appear in heredo-familial form, as Sainton's and Furno's cases show. Furno has recently been able to report the whole genealogical tree of a family in which nine male members were affected with eunuchoidism, which was a dominant characteristic transmitted directly by the females, 50 per cent of whose sons were of eunuchoid type. In only one generation was the anomaly transmitted from father to grandsons, but still through a daughter. In cases of mild eunuchoidism, in which a certain generative power is possible, the anomaly may be transmitted directly from father to son (Ciauri). We do not possess any extended observations on female eunuchoidism, which all believe to be exceptional, nor on its heredo-familial character; nevertheless, my experience teaches me that, although in a milder and less recognizable form, the eunuchoid type is far from rare in women. Only this year I have been able to observe two classic examples of this, one in a thin and the other in a fat subject.

In males as well as in females[1] we find in fact two varieties of pure eunuchoidism, the thin and the fat, according to the various consensual reactions of other endocrine glands to genital insufficiency, owing to which we have a different nutritive orientation of the organism or of the adipose tissue. We can readily understand that congenital and hereditary hypogenitalism is hardly ever an isolated constitutional anomaly, but that the whole organism with its many evolutionary errors, and especially the whole endocrine system, in view of the intimate relations of this with the sexual glands, takes part in the picture presented by the patient.

For this same reason we seldom find the complete form of primary hypogenitalism, or its attenuated form, which we may call the *hypogenital temperament.* More frequently we are dealing with incomplete and dissociated forms. Such forms are especially apparent when sexual hypoevolutism is the consequence not of a primary and a more or less pure or dominant constitutional insufficiency of the sex glands, but of constitutional anomalies of other endocrine glands which have a very great influence on the sexual development, such as the hypophysis, thyroid, thymus, the adrenals or the pineal gland; or if it is not subordinated to these anomalies, it is coördinated with them. Under such conditions certain characteristics of pure hypogenitalism may not reveal themselves. For example, if there exists at the same time an insufficiency of the anterior lobe of the hypophysis, there may be no macroskelia and no increase in stature, and in place of these there may be dwarfism or an exaggerated adiposity of hypophyseal type; or if we are dealing with male adolescents, we may find eunuchoid skeletal disproportions combined with physical feminism; if an insufficiency of the thyroid coëxists without being so serious as to cause skeletal dwarfism, the outstanding features may be the senile character of the skin, thin hair turning white prematurely, falling teeth and poor intellectual development, which is hardly ever the case in pure hypogenitalism. If instead there coëxists an anterior hyperpituitarism, we have acromegaloid characteristics of the head, hands and feet, besides preponderant development in width of the thorax, characteristics which are not found in pure eunuchoidism; we also find a masculine habitus in the female.

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[1] Women who are constitutionally hypogenital and (frequently) sterile, or who easily have repeated miscarriages because of the inability of the hypoplastic uterine mucosa to give nutrition to the fertilized egg, can often be distinguished by a stature taller than the average, by rather long legs, breast abounding in fat and a rather narrow pelvis covered with excessive fat; especially characteristic is a certain pasty aspect of the face with the skin of the forehead and temples prematurely wrinkled. Soft hair or hair of masculine type or hairy moles can generally be noticed upon the face, on the linea alba or on the limbs of these hypogenital women. Their character is apathetic and cold.

If there is a constitutional hyperthyroidism, the hypogenital subject may have a psychic temperament which by its vivacity and irritability, its emotionality and expansiveness, and the superior quality of its intelligence, is in strong contrast with the pure phlegmatic, close, pessimistic, depressed, schizothymic, at times puerile, hypogenital temperament which is also poor in imagination and intellectual creative power. In my experience we frequently find, in hypogenital and hyperthyroid types combined, the existence, sometimes to an exaggerated extent, of a psychic component of the sexual instinct, which is in strong contrast with their slight or even altogether wanting somatic potency. If, finally, there coëxists a cortical hyperadrenalism, as sometimes occurs in hypogenital females, the eunuchoid habitus in these acquires masculine characteristics in the type of hair distribution, the form of the skeleton and the facial teguments, the development of the voice, the thorax, the skeletal muscles and the psychic energy even to low grades of external feminine pseudo-hermaphroditism. According to a few recent observations of mine, there is often an exaggerated and paradoxical size of the mammary glands in these cases; the character is vivacious and irritable.

In the male, on the other hand, the coëxistence of a constitutional hyperplasia of the thymus with hypogenitalism often causes a certain degree of feminism in the physical form and may produce homosexuality, similarly to what occurs when there is a concomitant puberal hypopituitarism (in the male).

From all this we see how easily constitutional hypogenitalism may be associated with heterosexual tendencies and characteristics when it is coördinated with other endocrine anomalies or consensual reactions which are differently expressed in the male and in the female. In this way somatic and psychic hypogenitalism may be associated with homosexuality.

But with regard to the sexual instinct and its perversions we must at once show that this instinct not only is a function of the internal genital secretion but also is susceptible of dissociation from such secretion, more than any other sexual characteristic, and can be influenced more than any other by the central nervous system and psychic centers, as also by the hormonic function of other endocrine glands and by the whole individual affective temperament (Kretschmer). Thus we may even find complete hypogenitalism with persistence, in fact with exaggeration, of the *libido*. This occurs especially in women. Similarly, sexual perversions may be independent of the state of the genital glands and may be subordinated to the constitutional imbalance of the regulating neuro-psychic apparatus of the sexual life (Kretschmer's schizothymic constitution).

As Kretschmer has well observed, in the normal male the sex impulse often develops at the dawn of puberty, from a somatic and a psychic rudiment that are at first separate. Thus, on the one hand, a kind of pure, ideal dream is formed concerning persons of the other sex, and on the other hand, the first local stimulations on the part of the somatic zone are heralded. The two types of impulses exist for a while without any real merging, and contact between the two spheres of images may be delayed. Only with the advance of puberal development does the barrier gradually fall; somatic sexual excitement and the general orientation of the psyche for the loved one melt into one indivisible whole, rich in sensuous entrancement, so as to constitute the basis for the normal psychophysical love life of the healthy man.

Now in certain individuals, notably in those of schizoid temperament (see above), the fusion of the somatic and the psychic rudiment of the sexual impulse is occasionally delayed for a long while and may even never occur. Thus the somatic sexual excitement may, if it exists, continue on its way alone and be satisfied for example by masturbation, while the amorous psychic need retains a form similar to that of the beginning of puberty, and reveals itself in ideal platonic loves, in dreams and fantastic romantic fancies, in love for distant unknown persons, in a timidity and scrupulousness carried to such a point as to prevent the fulfilment of a sexual goal even intensely desired. Along with this sign of hypoevolutism of psycho-sexuality we may find other manifestations of insufficiently or abnormally fixed orientation of the sexual instinct, of a sexuality not strictly univocal, not directed to a precise object, such as homosexual inclinations or heterosexual mentality, or sadism, or a too strong attachment for the mother at an age at which the normal youth has already freed himself from these narrow infantile ties in order to give himself up to other affective ideals, or, finally, too long a voluntary ignorance of sex life, a crystallization of the psyche into a childish naïveté at an age at which others have already acquired the consciousness of their instinct.

Although all these stigmata of psychic sexual hypoevolution may, as we have said, be subordinated to an anomaly of the central nervous apparatus regulating psycho-sexuality, nevertheless, in my experience they are almost always accompanied by a certain hypogenesis and hypofunction of the genital glands (somewhat small external genital organs and, in the female, utero-ovarian hypoplasia and sterility). Most often this hypogenesis is combined with other hormonic anomalies.

A close study of hyperthyroid temperaments, for example, has enabled me to learn the frequency, especially at the age of puberty, in such temperaments of the aforesaid phenomena of psycho-physical sexual dissociation and of partial sexual hypoevolutism, as though an overactive thyroid function during the period of puberty might stimulate to excess the development of the nervous and psychic element regulating sexuality and impede its normal fusion with the somatic element.

In this connection we may recall that Kretschmer's schizothymic asthenics, in whom this author finds the dissociated sexual signs that I have just mentioned, often belong to the hyperthyroid type (see above). No less frequent than the partial psychic sexual hypoevolutisms are the partial hypoevolutisms of the somatic characteristics of sex. In the male we may find somewhat small testicles and penis (hypoplasia recognizable even from childhood in certain subjects); incomplete descent of the testicles or cryptorchidism, or very hard testicles of a fibrous consistency, or azoöspermia, oligospermia and infecundity; absence or scarcity of the definitive hair on the thorax and extremities that is characteristic of the adult male; hair of feminine type, neck with a large, round base; a rather wide pelvis, with a lumbar lordosis more marked than the normal, and narrow flanks; the mustache delicate, the breasts somewhat developed, the skin soft and fine, poor in pigment; hands and feet small and delicate (acromicria). In the female we find utero-ovarian hypoplasia, ovaries high up in the iliac fossæ, infantile in form (long, slender, with smooth surface, or occasionally large and hard), fibrous, tending to microcystic degeneration, menstruation sometimes slight and tardy, or again excessive, owing to the abnormal prolongation of the menstrual modification of the uterine mucosa, resulting from the excessive formation of interstitial cells in the sclerocystic degeneration of the ovary. Sterility and a tendency to miscarriage are frequently the consequence of this hypoplasia of the ovary, and still more of hypoplasia of the uterus, which is not mature enough to allow the attachment of the fertilized ovum.

Evolutive anomalies of the uterus and adnexa are in fact the most frequent of all anomalies of sexual characteristics in women, and the contrast is positively startling in some cases between the normal and exuberant development of the secondary feminine characteristics and of the psychic feminity, on the one hand, and the state of hypoevolutism of the genital canal (uterus, tubes vagina, external genital organs), on the other, as is also the contrast sometimes discovered between the beauty of a woman's body and the sterility and menstrual sufferings due to hypoplasia and anomalies of the genital canal!

All this leads us to assume, as in fact many authors do assume today, that the development of the uterus is up to a certain point independent of the internal ovarian secretion. The following marks are regarded as stigmata of infantilism of the genital canal—shortness, narrowness and delicacy of the vagina, small size of the labia majora and minora, and narrowness of the vaginal opening to such a degree as in some cases to make coitus difficult or impossible; a uterus with a small body and a long cervix, with hypoplasia of the median muscular tunica, especially in the fundus portion, or with persistence of the plicæ palmatæ in the body; or retroflexion of the uterus, which may be combined with an abnormal depth of Douglas' cul-de-sac and of the vesico-uterine pouch; both of these characteristics (as Kustner, Selheim and Freund have shown) are stigmata of infantilism of the uterus. As much may be said for the exaggerated anteflexion of the uterus. We may add the infantile form of the tubes, which are long, more or less convolute, with the peritoneum thrown across like a bridge, and with hypoplastic musculature—all of which conditions favor sterility and extra-uterine pregnancies (according to Freund, also serious adnexitis).

We often meet these hypoevolute anomalies of the genital organs of women in status thymico-lymphaticus and in lymphatism (Bartel, Neusser), in which we also frequently find the tendency to miscarriage, to weakness of the uterine contractions in labor, to uterine and vaginal laceration, to miscarriage from abnormal formation of decidua in a hypoplastic uterus (Schaffer), to placenta prævia, to retention of placental villi after parturition and to dysmenorrhea.

In enteroptosis and in asthenic constitutions we find, on the other hand, a predominance of anomalies of fixation of the uterus (movable uterus, with a tendency to retroversion and retroflexion, to prolapse, owing to weakness of the ligaments and musculature of the floor of the pelvis).

As regards fecundity, women of dolichomorphic or asthenic constitution, candidates for tuberculosis, are often extremely fertile, while women with a tendency to adiposity from the puberal age on, especially if taller of stature than the average, are often sterile or present a fecundity that becomes exhausted with a single child. Feminine hereditary dispositions are so evident that in some cases a daughter may have the same cycle of fecundity, the same menstrual type, the same tendency to have twins or to bear a majority of males or females as had the mother.

An important criterion of genital hypoevolutism is the abnormally small breast, and especially the breast with a flat, hypoplastic nipple, with an areola narrow and poor in pigment, or one raised in the form of a cone (*mamma areolaris,* a degenerative characteristic that exists normally in the negroid race); or the breast may be large, but its size due to an extraordinary accumulation of fat. The first characteristic of mammary infantilism is encountered in the thin, and the second in the fat, hypogenital subject.

On the other hand, we often find in the hypogenital male, especially in hypopituitarism and cryptorchidism, an increase in the size of the mammary glands, or in certain subjects the nipple alone is large or the areola strongly pigmented and cone-shaped. In some cases gynecomastia is found on the same side as the hypofunctioning testicle.

The constitutional factor in the genesis of tumors of the female genital apparatus and in that of prostatic hypertrophy in the male is of great importance. It is well known that we may find fibromyoma and cystoma in several women of the same family, and also that such neoplasms have a predilection for arthritic families and for women who are sterile or condemned to forced celibacy, or who have stigmata of utero-ovarian hypoplasia, and, in general, for women with constitutional imbalance of the endocrine system, particularly of the thyroid (frequent association of myoma and goiter). But also in prostatic hypertrophy, which is often due to a fibromyomatous or adenomyomatous new growth or hyperplasia similar to that of the myomatous uterus, and which has a predilection in the male for the same climacteric age as myoma in the female, we are led to assume the existence of a constitutional imbalance of the endocrine system (in countries where goiter exists, prostatic hypertrophy is extremely frequent) and the existence of the arthritic constitution, and of abnormal stimuli starting now from the testicle and now from other abnormally functioning glands (climacteric hyperpituitarism and hyperadrenalism?).

If now we examine that constitutional anomaly of the genital apparatus that is characterized by excess in the development of the apparatus itself and its function, we find here also a *primary pure hypergenital type,* and a type that is secondary or coördinated with other endocrine anomalies, in the latter of which the hypergenitalism appears often to be incomplete and dissociated or perverted.

We know but little of pure constitutional hypergenitalism. In association with Albano I have recently had the opportunity to make a study of it in a case where a youth, aged twenty years, had three testicles, which thus constituted an authentic case of hyperorchidism. In the hypergenital male, besides the exaggerated and premature development of primary, secondary and tertiary sexual characteristics, we have a dolichomorphic type of trunk with a noticeable excess of the thorax over the abdomen, and a marked narrowness of the transverse diameter of the pelvis, relative shortness of the extremities, a stature somewhat lower than the average, a large skull, bodily weight relatively excessive in comparison with stature (slight megalosplanchny), marked development of the skeletal muscles and of muscular strength, a large heart, physiological polycythemia, parasympathicotonia, a calm, stable, euphoric, hyperactive and energetic character with the artistic impulses strongly developed. In the hypergenital female we find a premature and exuberant development of the sexual system, especially of the pelvis, while the mammary glands are rather small and poor in fat. Menstruation appears early and sometimes occurs twice in one month, with leucorrhea in the intermenstrual intervals and exaggerated local sensitiveness of the genital organs and breasts; the stature is somewhat below the average, with megalosplanchnic proportions and great fecundity.

From my studies upon a considerable number of rather fecund women, who are very frequent in Sicily, I came across the unexpected fact that in the general constitution of these women certain stigmata of constitutional hypothyroidism abound (thin eyebrows and hair, falling teeth, fleshy eyelids, exaggerated obesity, thick, large hands, a tendency to rheumatism, hypersensitivity to cold and psychic depression). The climacteric period in these proliferative women is almost always stormy.

We are not in a position to state whether repeated pregnancies and lactation lead to thyroid exhaustion, as might be inferred from the observations of L. Lévi and Rothschild or whether ovarian hyperfunction directly causes a certain degree of hypothyroidism, or whether, finally, constitutional hypothyroidism is favorable to the development of hypoövarism, but it seems to me that all three suppositions are acceptable and find support in experimentation and clinical observations.

Assuming that in the female, as in the male, hyperfunctioning of the genital glands may induce a state of functional limitation in the thyroid, we can very well explain certain phenomena of premature senility (wrinkled face, loss of teeth, premature arteriosclerosis) which are frequently observed in individuals who are given to sexual overindulgence, and we may well ask whether such overindulgence may not hasten old age.

When hypergenitalism is secondary or is combined with primary anomalies of other endocrine glands, such as tumors of the pineal gland in infancy, or tumors of the testicles, or hyperplasia and neoplasia of the hypophysis and the adrenal cortex (especially in females), we observe, as a rule, marked dissociations in the sexual development and function, or a tendency to assume the characteristics of the opposite sex. Thus, women with hyperpituitary or hyperadrenal constitutions may present masculine characteristics, homosexual inclinations and an exaggerated libido.

I have recently pointed out a dysgenital syndrome very frequent in young girls and in adolescents, which I have termed *precocious matronism*, because of the finding of the bodily and sexual forms of a mature woman (matron's body) at a very early age; this applies especially to the size and form of the pendulous breasts, the breadth of the shoulders, pelvis and thighs and the adiposity of the legs and ankles. The face also has an adult expression at variance with the true age; menstruation appears prematurely; the character is vivacious, erethistic and irritable. Here we have probably a pluriglandular imbalance in which the dominant elements are follicular hyperovarism and cortical hyperadrenalism.

We shall merely refer to the fact that Steinach supposes the origin of homosexuality in certain individuals to be due to the abnormal persistence in the testicle of ovarian elements capable of stimulating, through the hormonic pathway, the attraction for the male sex; but this is a daring hypothesis and one that is not confirmed by subsequent histological investigations (Stieve). On the other hand, as we have said already, we cannot forget the intervention of the psyche in the modifications of the sex impulse, especially where this is perverted.

CHAPTER VIII.

CONSTITUTIONAL ANOMALIES AND INADEQUACIES OF THE NERVOUS SYSTEM.

Neuropathic and psychopathic diathesis—Close association of the nervous and endocrine systems—Many nervous and psychic anomalies an ontogenetic hypoevolutism—Hyperevolutism present in some instances—Gowers' abiotrophy—Morphological signs of nervous infantilism—Atavistic manifestations—Heredodegenerative and abiotrophic diseases—Predisposing constitutional anomalies—Glial diathesis—Primary endogenous sclerosis of nervous system—Idiopathic epilepsy—Degenerative stigmata in epileptics—Epileptoid character—Neuropsychasthenia—Relation to thyroid hormones—Difference of symptomatology in dolichomorphs and brachymorphs — Phthisic and apoplectic habitus.

We have now to examine briefly the numerous stigmata that mark the nervous and psychic anomalous constitution, the *neuropathic* and the *psychopathic diathesis*, the two diatheses most common in civilized man, which no one perhaps can entirely escape. This is because, of all the organic systems, that which controls the nervous and psychic functions is certainly the most complicated, the least perfect and the least stabilized both phylogenetically and ontogenetically in its definitive form and function, the richest of recent acquisitions and hence the most labile; that is to say, it is the apparatus that is most liable to vary on account of evolutive errors. What is more, the manifestations of its constitutional anomalies are the earliest, the most prompt to appear under the exciting influence of exogenous factors, in view of the fact that the neuropsychic apparatus, regulating the life of the separate parts and their mutual functional correlations in the unitary organism, reacts more quickly than any other system or tissue to abnormal stimuli, arriving from the external environment or generated in the internal economy through bad functioning of the organs. More than any other system it lives for itself and for others, a fact which exposes it to easy wearing out, to phenomena of exhaustion and to the revelation of its own miopragic or abiotrophic constitution. Possibly this was the reason why Nature placed close beside the apparatus controlling the nervous and psychic functions an auxiliary and reinforcing apparatus, designed to stimulate and regulate its trophism and to maintain the balance between its intimate anabolic and catabolic processes as the nervous tissue itself could perhaps not regulate it, being so functionally differentiated and so continually engaged in providing for the exigencies of the organism as a whole. This auxiliary apparatus, a true dial of the clock of life, if I may venture so to express it, is the endocrine apparatus.

This is why morphological or functional anomalies of the nervous system are so often found combined with morphological anomalies of the endocrine system that it not infrequently becomes almost impossible to distinguish whether one class of phenomena is subordinated to the other or whether the two are simply coördinated.

The directive, unitary concept under which we can group a very large number of nervous and psychical constitutional anomalies is that of *ontogenetic hypoevolutism* (occasionally also *phylogenetic*); that is, we may explain the anomalies as effects of an insufficient development of this or that part or function of the system, by virtue of which the anomaly prolongs into adult life a condition that is normal in infancy or at a less advanced stage of growth. More rarely the anomaly is of atavistic character, that is, it corresponds to a condition which is normal in lower animal species or in inferior human races.

That certain nervous and psychic anomalies may be interpreted as signs of ontogenetic hyperevolutism it is impossible to deny. But whether certain of these may also be interpreted as signs of phylogenetic hyperevolution, that is, as the appearance of new characteristics of a future higher type of man, is a problem still under discussion and one which can certainly not be solved with the naïveté with which many conceive the so-called *man of genius* to be a *superman,* even when in an artistic genius we find an insufficiency of the really higher intellectual powers, or when with true *intellectual genius* there is associated, as not infrequently occurs, a *moral hypoevolutism,* or, conversely, when a poverty of creative intellectual energy or a state of intellectual puerilism is associated with the *moral genius* of the saint. This criterion of valuation is quite on a par with that of one who would consider a *giant* a man somatically superior to the rest of his race! Thus far we have only the right to say that the most perfectly evolute man is the one who has, combined within him, the most perfect balance between the various parts of the body, a perfect harmony between the various segments and functions of the psyche, and, finally, a perfect concord between the somatic and the psychic life—naturally presupposing here a complete quantitative development, within the normal limits of variability of the species— of the various elements that constitute the soma and the psyche. This is for us, up to the present time, the ideal psycho-physical human type —the one most evolute ontogenetically because it is the farthest removed from the infantile type, and the one most evolute phylogenetically because it is the farthest removed from the anthropoid species, the most productive functionally and the most resistant to deleterious conditions of environment. Whether or not the future has in reserve a still higher ideal of human perfection than our present one (assuming that this is necessary for the preservation of the species, with which Nature seems to be chiefly concerned), a type of man even quantitatively more developed, more powerful and hence more productive in his various parts and functions, somatic and psychic, with all these perfectly equilibrated, we can neither affirm nor deny without losing ourselves in impossible prophecy and useless conjectures.

In addition to the concept of hypoevolutism we have a second guiding concept, under which we can bring together many apparently diverse nervous and psychic anomalies, namely, the insufficient supply of vital energy received by the nervous system from the very moment of conception, and hence the feeble resistance to environment, the early decline, the nutritive poverty and easy functional wearing out—an anomaly localized now in one part of the system and now in another (Gowers' *abiotrophy*).

This may naturally be combined with states of hypoevolutism, but may also reveal itself in parts of the nervous system that are apparently well developed from the morphological aspect, although it is possible here to invoke a *chemical hypoevolutism* of the nervous tissue, of which we are unable as yet to form any definite idea.

Finally, a third group of endogenous causal factors of nervous and psychic anomalies and diseases is that of qualitative embryofetal anomalies of development, of *dysgeneses* and *malformations* which more particularly involve now one and now another group of elements of the nervous apparatus, sometimes one system of fibers and cells and sometimes another. For example, in one case the ontogenetic anomaly involves the neuroglia more, in another the ependymal cells, in another the neuroblasts and in still another the myelinic sheaths of the nerve fibers, etc.

We interpret as morphological signs of infantilism or fetalism, or better, of ontogenetic hypoevolutism of the nervous apparatus, such characters as the following: the relatively large size of the brain, and narrowness of the space between the cerebral mass and the cranial limits (the ratio of the size of the cerebrum to the stature is 1 to 5.9 in new-born infants and 1 to 30 to 1 to 90 in adults, according to Obersteiner), a condition which is regarded by Rudolph as one predisposing to attacks of migraine and to epileptic crises; the presence in the adult cerebral cortex of cells placed horizontally or obliquely, with spindle-shaped protoplasm, a large vesicular nucleus, and two processes that run parallel to the cerebral cortex. These fetal cells are normally found in great numbers in the cortex at about the fourth or fifth month of fetal life, after which time they gradually disappear until we no longer find them in the new-born child. Now these cells abound in the brains of idiots and epileptics, in cases of mongolism and cretinism, and in individuals suffering from juvenile paresis, congenital syphilis and dementia præcox. Their presence may be combined with the so-called *microgyria*, that is, a hyperproduction of cortical gray matter, by virtue of which the surface of the cortex is richly furrowed and there is occasionally an undulating arrangement of the cortical cellular layers even in proximity to the white matter (Obersteiner, Lowy).

The especially small size of the nerve cells as compared with their size in other individuals of the same age may also be regarded as hypoevolutism. This is found in hereditary degenerates (Iendrassik). We know that in the embryo or in the fetus the presence of nerve cells with two or several nuclei is not rare. Now we may find these cells in mongoloids, in idiots and in persons suffering from dementia præcox, juvenile paresis or manic-depressive psychosis, and in all these cases they are found especially in the Purkinje cells of the cerebellum (Stein). Finally, we may find in the nervous system of degenerates cells that are little differentiated, with the characteristics of neuroblasts (Rondoni), pyramidal cells of the brain with only an indistinct pyramidal form, etc.

In the spinal cord signs of hypoevolutism, of which Stern has made a close study, are as follows: General hypoplasia, an oval rather than round shape of a cord section, poor development of the antero-lateral funiculi and shortness of the posterior funiculi, with an accentuated angle of the gelatinous substance of Rolando. We find a general *micromyelia* in individuals who are subject to Friedreich's disease. In microcephalics and congenital hydrocephalics the hypoplasia is mostly confined to the pyramidal tracts. In tabetics Stern has found the characteristics of the infantile cord mentioned above. Still more interesting is the discovery in tabetics, according to the studies of E. Lévi and of Bauer, of another anomaly which they interpret as atavism, and of which we shall make further mention later on.

Another characteristic of hypoevolutism is the relatively small size of the cerebellum in comparison with the cerebrum, and the persistence, or even the exaggerated development, in the former of the external granular layer. According to Biach this disappears during the ninth month of fetal life, but may sometimes still be found in the new-born infant one month after birth. This condition may persist in mongolism, microgyria, porencephaly, heredo-familial cerebellar atrophies, etc. In the nerve fibers we may observe an abnormal thinness and a deficient myelinization. These are developmental defects which are found in a more diffuse form in the so-called *aplasia axialis extracorticalis congenita* of Merzbacher, and may be combined with aplasia of the nerve cells in familial amaurotic idiocy (aplasia ganglio-cellularis of Merzbacher).

The abnormal size of the terminal ventricle of the spinal cord may also be looked upon as a persistence and exaggeration of an infantile condition, since the terminal ventricle undergoes a certain reduction after birth. It may prolong itself upward to a considerable degree, very much like a true syringomyelic cavity, and be accompanied by enuresis, sensory and reflex disturbances, atrophic alterations of the lower extremities, spina bifida, syndactylia, etc. (sacrococcygeal myelodysplasia).

The following may be interpreted as atavistic manifestations or, as Pick expresses it, manifestations of similarity to animals: In the cerebrum the so-called *Benedikt* or *criminal type* of convolutions, characterized by great depth and abundance of sulci with many anastomoses of these and of the convolutions, a condition found in the brains of cetaceans. These anastomoses are regarded by Schloss as regressive stigmata. They are frequently found not only in criminals and insane persons, but also in highly intellectual individuals, even in geniuses. We can also regard as an expression of atavism the very deficient development of the parietal and occipital lobes, like the brain of monkeys. In the medulla oblongata, according to Mingazzini, a sign of atavism is the exaggerated development of the *nuclei laterales*, which are highly developed in the rabbit and guinea-pig as well as in microcephalics and mongoloids. Another sign of atavism is the absence of the *nucleus arcuatus*, such as we find in anthropoid apes and other mammals, and, according to Bruce, also in microcephalics. In the spinal cord signs of phylogenetic hypoevolutism are the presence of a lateral sulcus in its thoracic portion and of a latero-ventral sulcus in its cervical portion (Biach); the penetration of Clarke's columns into the commissure, the approach of the gray matter on both sides, resulting in disappearance of the commissure, the union of the anterior horns at an angle, and the small size of the posterior funiculi, all of which characteristics are found in the bovine cord (Pick). Add to this the doubling or creasing of the gelatinous substance in the cervical region, such as we find in the cord of the Ungulata.

According to J. Bauer, in mammals from anthropoids down, the fibers of the posterior spinal roots lose their Schwann's sheaths a little outside of the periphery of the cord, while, according to the investigations of E. Lévi, this happens in man only in the lumbo-sacral portion, while in the dorsal cord the Schwann sheaths are prolonged with the glial portion of the cord up to its surface. Now E. Lévi regards this behavior of the lumbo-sacral roots as a factor predisposing to tabetic degeneration. According to Bauer, we find in tabetics that in the cervical region also the posterior roots have the same mode of passing into the glia of the cord as occurs in animals. Biach and Sibelius observed the same phenomenon, and the latter found this same radicular atavistic disposition also in paretics, and Bauer in the hereditary ataxia of Friedreich.

In certain animals, notably in rodents, the pyramidal tracts are found in the posterior funiculi. Now this atavistic anomaly has also been observed in man, along with other heterotopias of the pyramidal fibers in the form of *abnormal bundles*. These may be interpreted as the remnants of a phylogenetic phase in which the pyramidal fibers were possibly crossed along the whole extension of the encephalic trunk (Spitzer), before the decussation was condensed into the bulb.

Coming now to the signs of functional hypoevolutism of the neuro-psychic system, we may mention as such the hypoesthesia and hypoalgesia that are frequent in children and are often found in criminals and psychopathics; hyperreflexism (hypoevolutism of the inhibitory centers of the reflexes); enuresis from myelodysplasia, spasmophilia, which we tend today to associate with a constitutional insufficiency of the parathyroids. These glands are physiologically unstable and miopragic in infancy, a fact that explains the characteristic tendency of infants to diseases due to insufficient assimilation of calcium (rickets). Spasmophilia, as we know, reveals itself by the characteristic mechanical and electrical hyperexcitability of the nerves and muscles. Congenital and familial myotonia is also regarded by some authors (Babonneix, Apert) as a muscular hypoevolutism, in the sense that, because of the predominance of the undifferentiated sarcoplasm (destined to be formed into fibrils) over the anisotropic substance of the muscular fibers, we have an excess of tonus which, as is known, is attributed to sarcoplasm. On the other hand, an insufficiency of the tonus due to poor development of the sarcoplasm explains *idiopathic hereditary tremor*, according to Pelnár.

Bauer has observed another symptom which he interprets as a sign of functional infantilism of the cortico-spinal motor tracts, the so-called *pseudo-Babinski phenomenon*. It is known that the phenomenon of the great toe is normal in the new-born and in young infants up to the second half of the first year of life, and only later on is this spinal plantar reflex masked and supplanted by the flexor reflex of the great toe, of cortical type. So that in cases of deficiency of this second reflex (lesion of the pyramidal tract, exclusion of the cortex) the original extensor plantar reflex reappears. This may also occur in cases of functional hypoevolutism of the tract of the cerebral reflex. In that case there appears a reflex of the great toe which in reality shows some points of difference from the classical Babinski, in that it is not constant at all times, and that the extension of the great toe does not take place with the same slowness as in the ordinary Babinski; moreover, the reflexogenic zone is limited more to the sole of the foot; there is no fan-like spreading of the other toes, nor do we find the other symptom described by Babinski, the *associated extension of the great toe*, when the patient sits on the bed without support, with legs extended and abducted.

This *pseudo-Babinski* of Bauer has been found independently of organic lesions of the pyramidal tract in cases of infantilism, eunuchoidism, status thymico-lymphaticus, achylia, orthostatic albuminuria, enteroptosis, neurasthenia, hysteria, war neurosis, chlorosis, tetany, arthritis deformans, etc.

We might perhaps also regard as a type of hypoevolutism of the vegetative nervous system a constitutional vagotonia, the preponderance of the tonus and excitability of the parasympathetic system over the sympathetic, which is so frequently associated with states of somatic and psychic hypoevolutism, since, as we know, the parasympathetic nerves preponderate in the dynamic balance during the first years of life.

We also regard as stigmata of nervous infantilism the ready hypersecretory action of the choroid plexuses, with a tendency to sudden increase in size of the cerebrum followed by phenomena similar to those of migraine, especially if these are favored by the persistence of an infantile condition (Schuller, Rudolph) of excessive development of the cerebral mass in proportion to the size of the cranial cavity.

The exaggerated need of sleep of some subjects, for instance, that of certain young neurotics, recalls the physiological hypersomnia of infants. On the psychic side we find infantilistic stigmata not only in the various degrees of delayed and deficient quantitative development of intelligence, affectivity and will, but also in an exaggerated suggestibility and a tendency to imitation, to stereotypy, perseveration and negativism, in poor control of feelings and instincts, exaggerated timidity and a tendency to anxiety, dreams and crying. Many of these infantile psychic characteristics are found in the hysterical temperament, in which we have many reasons to suppose a state of hypoevolutism of the field of consciousness and of the power of concentration and synthesis of the contents of consciousness, owing to the tendency to dissociation and splitting of consciousness (Janet).

We have already taken up elsewhere the various stigmata of hypoevolutism of psycho-sexuality.

We must point out another whole group of pathological nervous tendencies which may be brought together under the heading of heredo-familial abiotrophic conditions, or degenerative states of the nervous system, due to lack of vitality of certain segments or systems of cells and fibers, which undergo premature atrophy and degeneration during their period of physiological activity, or easily suffer from the action of poisons and toxins, or undergo premature aging. It is upon this abiotrophic disposition that innumerable nervous diseases develop which, although apparently different in their anatomical and clinical aspect, are nevertheless so bound together by transitional forms that the concept so recently sustained by certain neurologists, such as Kollaritis, seems perfectly justified, namely, that we are here dealing with multiform manifestations of *a single general abiotrophic heredo-degenerative disease* of the nervous system. This is true for Friedreich's hereditary spinal ataxia and for the hereditary cerebellar ataxia of Marie, for progressive muscular dystrophies, congenital athetosis, hereditary chorea, hereditary spastic paralysis, progressive cerebral diplegias, hereditary nystagmus, familial amaurotic idiocy, familial optic atrophy, dementia præcox, juvenile paresis and juvenile tabes. In all these heredo-degenerative diseases we find many stigmata of general constitutional anomaly, such as ogival palate, scaphoid shoulder-blade, facial asymmetry, hypospadias, cryptorchidism, acromicria, absence of ear lobe, hematic mononucleosis, myxedema, dwarfism, status thymico-lymphaticus, etc.

Closely related to the heredo-degenerative and abiotrophic diseases are some of the exogenous diseases of the nervous system, such as those of syphilitic origin, like tabes and general paresis, in which the studies of Stern and numerous other authors have brought out a great number of predisposing constitutional anomalies, such as the dolichomorphic hyperthyroid constitution in tabes, the brachymorphic megalosplanchnic hypothyroid constitution for general paresis, not to mention the hypoevolute and atavistic anomalous characteristics of the cord of tabetics and of the brain of paretics, which we have already discussed.

Finally, under the unitary concept of embryo-fetal dysgenesis, we must include a third group of pathological dispositions of the nervous system, comprising especially the tendency to sclerosis, gliosis, new growths of the brain, spinal cord and peripheral nerves, and also the formation of cavities and dilatations of the cord cavity.

Glial diathesis, the hyperplastic or neoplastic tendency of primitive glial, or more or less differentiated, cells, is the common bond of that entire series of heredo-familial nervous diseases that usually develop on the soil of the lymphatic or thymico-lymphatic or hypoplastic constitution, and which include cerebral tuberous sclerosis and gliomatous cerebral hypertrophy, spinal gliosis and syringomyelia, glioma, neuro-fibromatosis, pseudo-sclerosis, progressive lenticular degeneration, and other degenerative scleroses of the corpora striata, with the syndromes of chronic chorea, of congenital double athetosis, paralysis agitans, dystonia musculorum deformans, sclerosis of Ammon's horns and the cortical gliomatosis of epileptics. We may recall the relations, pointed out by Bartel, between cerebral glioma and status lymphaticus and status hypoplasticus, the coincidence of glioma with syringomyelia and the relations of the latter with proliferation of the ependymal and matrix cells of the glia in the walls of the spinal canal, with secondary dilatation and deformation of this canal or the formation of a circumscribed syringomyelic cavity, after necrobiosis of the proliferated cells (Schlesinger); the close relationship between tuberous sclerosis and multiple neuro-fibromatosis, shown by Verocay, Iczechowski and Nowicki, who speak of a *central or peripheral or universal neurinomatosis*, that is, a tendency to new growth of the primitive neuro-epithelial cells, occasionally associated with anomalies of other derivatives of the ectoderm (as, for example, multiple cutaneous moles); finally, that special glial hyperplasia, with atrophy of the nerve cells and disintegrative foci, that is demonstrated in Wilson's disease and in its allied syndrome, cerebral pseudo-sclerosis of Westphal-Strümpell.

In addition to glial dysgenesis and primary endogenous sclerosis of the nervous system we must also mention the special anomalies that involve the myelinic sheaths of the nerve fibers, which undergo degeneration with secondary neuroglial proliferation, as happens in multiple sclerosis, which is often found in individuals with other degenerative signs, such as ogival palate, prognathism, meeting of the eyebrows, dental caries, feminism, status thymico-lymphaticus and infantilism (Borchardt). According to Bauer, the phthisic habitus is especially predisposed to multiple sclerosis.

A special constitutional anomaly of the motor centers of the brain, which today seems more and more to be correlated with (but not definitely in relations of interdependence) endocrino-sympathetic anomalies, is that which underlies idiopathic epilepsy, or better, as we more accurately believe today, the *epileptogenous reaction of the nervous centers*, since it is this special mode of cerebral reaction that constitutes the fundamental phenomenon of the various epileptic syndromes (Redlich). We do not know just what constitutes the evolutive, morphological, chemical and functional anomaly of the brain, by which the epileptogenous disposition is determined, but it is certain that the degenerative stigmata hitherto found in epileptics are very numerous, such as cranial and other skeletal deformities (syndactylia, polydactylia, hyperphalangism, scaphoid shoulder-blade), ear, eye and tooth anomalies, left-handedness, facial asymmetries, stammering and other speech disorders, analgesia, hyperexcitability of the vegetative nervous system, and especially of the parasympathetic (vagotonia, to which Tinel has recently called attention).

From the anatomical point of view attention has been drawn to the excessive size of the brain, to microgyria, sclerosis of Ammon's horns and the presence of fetal cells, of heterotopic and disoriented cells, or of immature cells in the cerebral gray matter.

Of particular interest are some of the recent researches that demonstrate the close affinity of the epileptogenous with the hypothyroid diathesis and with spasmophilia (Peritz), the relationship of genuine epilepsy to constitutional hypogenitalism and hypopituitarism, and, according to Buscaino, especially to dysthyroidism. On the basis of my own endocrinological experience, however, I do not believe that we can assign a preponderant importance in the genesis of epilepsy to this or that particular endocrine anomaly, but that this affection must be attributed to a primary degenerative autochthonous anomaly of the brain, which may indeed often be, but is not always, associated with constitutional endocrine imbalances (various forms of hypoendocrinism and hyperendocrinism).

In this connection we may also mention a psychic temperament recently studied by Buscaino, which is near enough to the epileptic to be termed *epileptoid character*. This, to which Buscaino gives the name of *constitutional cenesthopathy*, is found in a still poorly defined group of individuals who often present various morphological and physiological degenerative anomalies, such as cranial and facial asymmetry, narrow forehead, prominent cheek bones, projection of the upper dental arch over the lower, ears sometimes sessile, sometimes outstanding, furrowed tongue, fierce eyes with wide palpebral fissure, abnormal tooth implantation, hypoesthesia and hypoalgesia, concentric restriction of the visual field, absence of conjunctival and pharyngeal reflexes, red dermographia, increase of tendon reflexes and of neuro-muscular excitability, unsteadiness of the pulse with a tendency to tachycardia, oculo-cardiac reflex of sympathicotonic type, various constant disturbances of cenesthesia and of sleep, moderate intelligence, a violent, brutal, intolerant character and a tendency to vice and crime. Especially characteristic are the great irascibility and impulsive reactivity, which often discharge themselves in outbursts of rage. These manifestations are accompanied by a twilight state of consciousness, and would leave a doubt as to their character, whether this is hysterical or epileptic, were there no other clinical criteria of differentiation. Also the lines of demarcation between these patients and schizothymics and schizophrenics are poorly defined.

One of the most frequent ways in which constitutional inadequacy of the nervous and psychic system reveals itself is undoubtedly the tendency to so-called neurasthenic and psychasthenic phenomena, which do not consist solely, as many affirm, in irritable weakness of the nervous system, which is the soil common to neurasthenia, hysteria and all other neuroses of the vegetative nervous system. They are not based merely in nervous and psychic asthenia, because one may be asthenic without being neurasthenic; but they consist in the sensation (apparently unmotivated or out of all proportion to the extent of the objective anatomical and functional disturbance) that this or that particular organ is out of order, and in the conviction of the patient that he is a sick person, in a feeling of *deficit* of vital energy, of lack of power, of functional exhaustion; all these sensations are conjoined with a state of mental suffering, of hyperemotivity, of cerebral unrest, exaggerated worry and consequent inhibition of volitive and motor activity. It is probable that this neuro-psychic constitutional anomaly, characteristic of neuro-psychasthenia, is especially dependent upon a state of hyperexcitability of the sensory nerve-endings and centers of the nervous system of the vegetative life, by virtue of which the internal stimuli, and especially those connected with the instincts of self-preservation and reproduction, easily pass beyond that diaphragm which separates our internal world from our conscious ego. If we add to this sympathetic hypersensitiveness of the neurasthenic a hyperevolute psychic constitution (especially on the side of affectivity), of such a kind that the said internal sensations, bound to the two fundamental vital instincts, provoke a long mental and emotional conflict and consequently a chronic state of emotivity—a restlessness of the brain, which, owing to its partial hyperevolutism, opposes to the manifold internal impulses all sorts of inhibitions, reflections, scruples and prejudices—we have the complete neuro-psychic picture of the true neurasthenic.

Now, although this neuro-vegetative and cerebral condition may also be provoked by exogenous factors, especially toxic or toxinfectious ones (acquired neurasthenia), it is, nevertheless, undeniable that in the vast majority of cases there exists a congenital neurasthenic constitution, which in a considerable number of cases I find bound to the hyperthyroid dolichomorphic constitution, as Ravà too has recently assumed.[1] This is easily explained by what we know of the influence exercised by thyroid hormones on the excitability of the sympathetic system, on the emotivity and on the evolution of the affective life.

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[1] Naccarati also found that psychoneuroses are more frequently met with in individuals possessing the characteristics of the two ectypes of the general constitution and that microsplanchnics have a definite tendency toward the asthenic forms, while megalosplanchnics tend toward the emotional forms, of psychoneurosis.—S. N.

We may also find, it is true, in a smaller number of cases the neurasthenic temperament associated with the megalosplanchnic or apoplectic constitution, but here, as Stiler has observed, we are dealing for the most part with acquired and transitory conditions; I may add that in these cases too stigmata of constitutional hyperthyroidism may often appear. And in these neurasthenics of megalosplanchnic habitus we frequently observe a different class of symptoms from those in microsplanchnic neurasthenics. In the former there is a predominance of cardiac disturbances, both subjective and objective (extrasystoles, respiratory and juvenile arhythmia, bradycardia, exaggerated vagal reflexes) and derangements of the genital function (attacks of psychic impotence, ejaculatio præcox, etc.), while the digestive, muscular and cerebral activities may remain unchanged; but in microsplanchnics there is predominance of asthenic and sensory disturbances in the gastro-intestinal, muscular and intellectual spheres. In the first case we find chiefly vagotonic, in the second chiefly sympathicotonic, phenomena.

With regard to the constitutional disposition to visceral, vasomotor and trophic neuroses, clinical experience teaches that in perhaps no other field of internal medicine is there so clear a preponderance of endogenous, hereditary and congenital factors in the genesis of morbid syndromes as in the pathology of the autonomic system.

This has been shown in an exhaustive manner by De Giovanni. Guided by the constitutional principle, he has brought together all the scattered branches of the various neuro-vegetative clinical syndromes under the unitary concept of sympathetic constitutional *neurosis*, the concept that these represent a morphological and functional evolutive anomaly in strict correlation (according to his own studies and those of his school), with developmental errors of other parts of the organism. From this point of view we may simply call attention to the *sympathetic nature of the disease tendencies* of both the extreme variants of the morphological constitution, the phthisic and the apoplectic habitus, although the *form* assumed by this tendency of the vegetative nervous system in the two antithetic types, and especially in the pure non-hybrid varieties of these (see above), may indeed be different and often of antithetic character (Pende). Thus we have in the phthisic habitus a predominance of sympathicotonic, angio-spastic, hypotrophic, excito-catabolic, hyposecretory phenomena, inhibiting the motility of the internal organs (except the heart and the vessels); and on the other hand, we have in the apoplectic habitus a predominance of parasympathicotonic, angio-ectatic and congestive, excito-anabolic and hypertrophic or neoplastic, hypersecretory phenomena, stimulating the motility of the internal organs (again excepting the heart and vessels); but in both types we find an instability of neuro-vegetative manifestations. We already know that it is in the endocrine variations of the two types that we may seek the reason for the numerous formulæ of constitutional individual sympathetic imbalance. The constitution of the vegetative nervous system is intimately coördinated with the hormonic constitution. We say coördinated and not subordinated, because, while many factors today speak for a relation of reciprocal physiological subordination between the two systems, the endocrine and the sympathetic (endocrino-sympathetic apparatus of Pende), we can nevertheless not deny *a priori* the possibility of the existence of primary autochthonous anomalies of the vegetative nervous system and of its centers in the cerebrospinal axis, although with these phenomena we must very often find associated functional disorders of those endocrine glands which receive their regulating innervation from the altered neuro-vegetative sections.

We shall not dwell here on the predisposing soil which the principal psychic temperaments offer to a strong group of psychoses (schizophrenia, manic-depressive psychosis), since we have already alluded to this subject elsewhere.

CHAPTER IX.

ANOMALIES AND CONSTITUTIONAL INADEQUACIES OF THE ENDOCRINE SYSTEM.

Their high place in modern constitutional pathology—Endocrine glandular diathesis hereditary—Sympathetic and endocrine systems a single apparatus—Familial endocrinopathies—Dysglandular heredity attacking different organs in progenitors and descendants—Findings of experimental pathology—Effect of maternal glands on fetus—Tuberculosis and syphilis—Importance of arthritic diathesis in the genesis of endocrinopathies—Their mode of manifestation in particular glands—Description of the various endocrine temperaments.

In view of the function that the hormones, in collaboration with the nervous apparatus of the vegetative life, exercise in establishing the correlations between all the parts of the organism and between the somatic and the psychic aspect of the individual personality, and hence, in view of the preponderant (but not exclusive) part which these play in the determination of the somatic-psychic constitution, we can understand how congenital and hereditary inadequacies and anomalies of the endocrine system come to occupy a very high place in modern constitutional pathology. We desire once more, however, to insist upon the concept that the *individual hormonic formula* cannot be considered separately from the primordial state of the tissues upon which the hormones act, and even if we could know *a priori* the functional attitudes of the various endocrine glands in a given individual, we could not determine the general constitution of the subject nor the partial constitutions of his separate organs and apparatus through these alone. Only after a constitutional study of these organs and apparatus can the individual endocrine formula be estimated at its proper value as a determinant of the individuality.

This is why we have preferred to deal with the endocrine constitution after having rehearsed the constitutional anomalies and inadequacies of all the other organic systems.

The fact of hereditary and congenital anomalies of the glands of internal secretion is demonstrated by experimental and clinical proof. These naturally reveal themselves at a certain period of extra-uterine life when the intervention of occasional endogenous and exogenous factors tends to exaggerate the constitutional morbid tendency to these glands. In brief, there exists an *endocrine* glandular diathesis; and it is an interesting fact that this may appear under a twofold aspect, as the glandular diathesis and as the nervous diathesis.

From the concepts outlined above concerning the close functional relationship between the endocrine glands and the nervous system, we can readily understand how hereditary and congenital anomalies of the nervous system must necessarily create a morbid tendency of the endocrine apparatus, and how the nervousness of ancestors may in fact reveal itself in the descendants in this way. Here we are not dealing, at bottom, with an indirect or heterologous morbid heredity, since we know that from the physio-pathological point of view the sympathetic and the endocrine system form a single apparatus, which we call the endocrino-sympathetic apparatus. Hence the hereditary or congenital anomaly may directly or originally concern either the endocrine glands or the autonomic system, or may involve both systems at the same time. What we have said for the hereditary factors we must repeat, as we shall see, for the activating and determining factors of endocrinopathy.

The influence of the hereditary predisposition to endocrine glandular diseases is shown first of all by clinical medicine, in the existence of *familial endocrinopathies.* Just as there exist familial nervous diseases, so may we observe, often in association with these, familial thyroid, adrenal, dysgenital, thymic, hypophyseal and pancreatic states. We shall see that cases are more frequent than is supposed in which in several members of the same family there are functional disturbances of the thyroid gland, ranging from the mildest degrees of hyperthyroidism to the most severe forms of Basedow's disease. And it is interesting to note that while in some members of the same family the thyroid gland is predisposed to phenomena of pathological functional exaggeration, in others it is miopragic, and we find all degrees of hypothyroidism, so that we sometimes find a complete Basedow syndrome in the mother and myxedema in the son.

The same may be said for the other endocrine glands. We need only mention cases of gigantism and acromegaly, or familial hypopituitarism, cases of familial hypoadrenalism, chlorosis, status thymicus (mors thymica in several children in the same family), eunuchoidism, and cases of familial diabetes and obesity (diseases in rather intimate pathogenetic relation to endocrine changes).

We must next take into account the fact that dysglandular heredity does not always attack in the descendants the same organ that was involved in the progenitors. The disease tendency of the endocrine apparatus may migrate, so to speak, may change its seat in passing to descendants. This is readily understood from what has been said about the close correlations between various glands. Thus we see a thyroid condition in the ancestors producing status thymicus or status chloroticus in the descendants. According to Marañon's observations we often see a thyroid state produce in the descendants a hypophyseal state, or *vice versa;* McCarrison points out that in India women suffering from tetany (hypoparathyroidism) produce cretin children (hypothyroidism).

Experimental pathology is beginning to throw light on these clinical observations. Thus I have observed that by feeding pregnant cats with rather large doses of thyroid substance we could cause hyperplasia of the thymus in the fetuses a hyperplasia all the more certain in that the fetuses presented a condition of marked cachexia, which, by itself alone, would have led to involution of the thymus. Hoskins has made similar observations in guinea-pigs. From 28 pregnant guinea-pigs treated with thyroid substance 21 fetuses were delivered. Upon determining the weight of the organs of these fetuses, in comparison with that of the organs of 20 fetuses from normal guinea-pigs, it was found that while the adrenal glands, the ovary and the thyroid showed a diminution in weight, the thymus was, on the contrary, hyperplastic (0.44 per cent of the total body weight as against 0.26 per cent in the new-born of normal guinea-pigs). Hyperplasia of the thymus involved the cortex almost exclusively.

Experimental hyperthyroidism in the pregnant is, accordingly, capable of determining in the fetus the atrophy of certain glands (adrenal, ovary, thyroid) and hyperplasia of others (thymus); these investigations may explain the eventual manifestation of status thymicus in the children of hyperthyroid subjects.

On the other hand, we have found by experimentation that thyroid insufficiency in the mother may determine thyroid changes in the fetuses. According to Halstead, Edmunds and R. Hunt, after extirpation of the thyroid in the mother, the offspring have hypertrophic thyroids. Hoskins found that the adrenal glands too were hypertrophic. On the other hand, Almagià has found that puppies suckled by a mother whose thyroid had been extirpated showed signs of myxedema, and the same was observed in infants normal at birth, but suckled by mothers with thyroid insufficiency. Hart and Steenbock have shown that the feeding of a diet rich in proteins to pregnant sows alters the maternal thyroid, and the young pigs are born without hair and with signs of hypothyroidism. McCarrison has shown the transmission of maternal hypothyroidism to children in cases of hereditary cretinism. According to Fiore, the offspring of thymectomized mothers show a hypotrophic thymus; in the offspring of parathyroidectomized mothers we find, according to Iselin, signs of latent parathyroid insufficiency. We may also mention that Manfred Fränkel demonstrated congenital hypoövarism, transmissible by heredity, in young guinea-pigs born of mothers whose ovaries had been irradiated. These experiments are of great importance from the point of view of the inheritance of acquired characteristics.

Hence the state of the maternal endocrine glands undoubtedly influences the fetal glands. Very important also are the changes that the fetal glands may undergo during intra-uterine life, as the result of toxic, toxinfectious or psychic influences acting upon the mother. We shall confine ourselves to pointing out the special importance, from this point of view, of two toxinfections, tuberculosis and syphilis, since clinical and experimental findings have shown that these two infections act somewhat differently from one another upon the fetal endocrine glands.

While syphilis of the parents, through the action of treponemas localized in the fetal glands, produces phenomena of sclerosis with atrophy of the parenchyma and arrested development of the glandular tissue, the tuberculous toxins that pass from the blood of the mother into that of the fetus seem capable in some cases of stimulating the function of certain endocrine glands. In fact, we have been able to find, both in new-born children from consumptive mothers and in fetuses of guinea-pigs inoculated with tuberculosis during pregnancy, a greater differentiation and also histological phenomena of secretory stimulation in the thyroid gland, hypophysis, adrenal cortex and the interstitial gland of the testicle.

In heredo-syphilitic new-born, on the other hand, all the endocrine glands exhibit a condition of more or less advanced specific sclerosis.

We believe that the congenital anomalies of the apparatus of the glands of internal secretion of subjects born of tuberculous and syphilitic parents make it possible to give a satisfactory explanation of many anomalies of development which we observe in the extra-uterine life of these persons. For example, certain recent observations of mine upon late heredo-syphilis of the internal organs have shown me the frequency in these heredo-syphilitics of syndromes of mild hypopituitarism, which seems very often to be accompanied by congenital mitral stenosis and sometimes also by relative hypogenitalism (in females, sterility or poor fecundity).

It is presumable that other infections and intoxications of the parents may act upon the endocrine organs of the fetus in a manner analogous to that of the two aforesaid infections.

It is perhaps by way of the changes induced in the endocrino-sympathetic system of the offspring that the emotions, the psychic shocks of the mother during pregnancy, may act. Popular experience, and to some extent also the observations of pathologists, attribute to such psychic traumata the power of determining anomalies of development in the product of conception. Up to our own day these facts have been gathered with great skepticism, for the reason that we were unable to explain how the psyche of the mother could influence the fetal organism, since, according to the anatomists, there were no nervous connections between the mother and the fetus. But now that we know the influence of the psyche upon the hormonic secretions and that of the hormones upon the great sympathetic system, we can conceive how a nervous or psychic trauma of the mother might succeed in disturbing the endocrino-sympathetic balance of the fetus and hence its normal development.

Lastly, we must briefly point out the importance of the arthritic diathesis in the genesis of endocrinopathies. In descendants of arthritics we frequently find thyroid, chlorotic and thymic states; in fact, it is probable that arthritic diathesis is nothing but a glandular diathesis, as the French authors maintain today and as Castellino assumed long ago.

If we turn now to the mode of manifestation of the constitutional anomalies of the particular endocrine glands, we must first of all show how their anomalies of form, size and structure do not always enable us to foretell the entity and nature of the functional disorders. What is true of the brain is true also of the endocrine glands, namely, that it is not always possible to deduce from the size and form the subject's degree of intelligence or the quality of his psyche. Especially the border-line manifestations of the endocrine organs, that is, the insufficiency and hyperfunction due to an anomalous, constitutional, *temperamental* or *premorbid* attitude of the said organs, may very well reveal themselves without sensible anatomical or morphological changes of the glandular parenchyma, although minute histo-chemical changes must always be assumed to lie at the bottom of these, even though they elude our present-day methods of investigation.

We shall now briefly point out these various endocrine temperaments, which have been discovered for the most part by the constitutional study of endocrinopathic subjects in the period that preceded the appearance of definite glandular disease and in the period that followed its apparent clinical cure; also by the study of endocrinopathics whose families have members with all degrees of functional change of the same endocrine gland as that which is affected in the patient; by the study of hyperfunctional or hypofunctional symptoms presented by the endocrine glands under certain physiological conditions of the organism which demand greater work from certain glands, as happens at puberty, during pregnancy, in the menstrual cycle and at the menopause, under which conditions various hypoendocrine or hyperendocrine temperaments are easily revealed. Finally, these different endocrine temperaments are shown by the comparative study of the morphological and functional signs of certain constitutions, with manifestations that can be experimentally and clinically provoked by the administration of glandular extracts or by the partial functional suppression of the endocrine glands.

We shall naturally overlook at present those *complex* or mixed *dyshormonic personalities* due to constitutional anomalies involving several or all of the glands at the same time. Such personalities are certainly the ones most frequently met in practice, although the functional anomaly of a single gland may predominate. Monoglandular temperaments and constitutions, which we shall review, must, therefore, be understood as individualities in which, in the constitutional hormonic imbalance, the *dominant note* in the endocrine formula is either the hypofunction or the subpathological or premorbid hyperfunction of a given gland.

HYPERTHYROID CONSTITUTION.

From the morphological angle, the individual appears in pure cases to be of slightly microsplanchnic type, with premature and pronounced morphological differentiation, with vertical diameters preponderating over horizontal ones, and with constant and pronounced dolichomorphism, especially of the trunk. There are elegance and juvenility of bodily form, with a tendency to remain youthful; frequent accentuation of lumbar lordosis, narrow waist, habitual thinness which is hard to correct by superalimentation, frequent losses of weight, especially through psychic influences; long, thin, muscles, sometimes hypertonic, somtimes hypotonic, according as the subject is or is not under physical training; sexual characteristics well developed, but the psychic element in these more so than the somatic, with a tendency toward dissociation of the two; abundant development of the hairy system, especially that of the scalp, but also that of the eyebrows, trunk and extremities; a tendency to hyperpigmentation of the skin; excellent formation and rapid growth of teeth and nails; large, brilliant, vivacious eyes, in some cases rather prominent; warm, flushed skin with a tendency to hyperidrosis; very marked features, but with elegant and dolichomorphic lines; usually, but not always, a slightly enlarged thyroid. The heart and arterial system are well developed, with the left ventricle and aorta relatively preponderant over the right ventricle and the pulmonary artery; there is a tendency to hypertrophy and to neurotonogenous dilatations of the heart and large arteries. Only in certain cases (not always, as Brugsch believes), when the hyperthyroid temperament is coördinated with status lymphaticus, do we find a small heart, narrow arteries and hematic lymphocytosis.

The systolic blood-pressure is normal or slightly augmented, while the diastolic is more often slightly diminished, whence comes a strong throbbing of the arteries. There is a tendency to tachycardia and to vasomotor hyperexcitability with preponderance of vasodilator phenomena, especially of the head, face and hands (on this account, according to Th. Kocher, the temperament corresponds to what was formerly called the sanguine temperament).

The stomach is miopragic and rather small, with a tendency to hypotonogenous dilatation. The intestine has an exaggerated peristalsis, with a tendency to loose stools. The fecal mass is large.

The elements of the blood are ordinarily well developed. There is some tendency to hyperglycemia, to diminished tolerance for carbohydrates and to biliary hepatic congestions (the bilious temperament of the ancients). The basal metabolism is accelerated and there is often poor assimilation of protein and exaggerated combustion of fats; there is apt to be also increased renal elimination of chlorides, exaggerated elimination of phosphorus and calcium through the urine and intestines, and hyperthermia from nervous and psychic causes. From the functional angle, tachypragia or swiftness of all the functional reactions is characteristic—a youthfulness of functions which corresponds to morphological juvenility and which is well explained by the action of the thyroid hormone on all the cells, which serves as a multiplier to increase the speed of formation of the *quantum* of potential energy contained in the cells themselves (Plummer).

There is a special dominance in the hyperthyroid temperament of a marked irritability of the vegetative nervous system, especially of the sympathetic subdivision, as there is also a tendency to great psychic irritability, hyperemotivity, cerebral unrest and quick and unstable psychic processes in general. Intelligence develops early and is often of high grade. The subject has little tolerance for thyroidin, adrenalin or iodine preparations.

HYPOTHYROID CONSTITUTION.

This is characterized by a complex of somatic-functional psychic signs that are the reverse of those enumerated above. We find a brachymorphic habitus; the subject is rather thick-set and of a stature somewhat below the average, with a tendency to general adiposity and to special fatty deposits on the face and neck, and in the supraclavicular fossæ; the vertical diameters are deficient while the horizontal are exaggerated; the development of the trunk, particularly the abdomen, exceeds that of the extremities as regards relative dependence. The head is large, the neck short and thick, the hands short and stubby, the eyes rather small and expressionless, the nose short and thick, the face round with features poorly marked, the hair poorly developed on the head, eyebrows (especially the external third), trunk and extremities.

The skin is thick, fat and puffy, with but little sudoral secretion, poor in pigment, of a dirty sallow color, prematurely wrinkled, with little vitality and poor resistance to microörganisms. This type is subject to premature baldness and white hair and to dystrophies of the teeth and nails.

The muscles are usually well developed, not very agile but quite energetic. There is sufficient development of the sexual characteristics and functions. The left heart and the arterial system are poorly developed in comparison with the right heart and the lymphatic-venous system. There is a tendency to cardiac dilatation and to lymphatic and venous engorgement and stasis.

There are low blood-pressure, microsphygmy, habitual bradycardia, torpid vasomotor reactions, acrocyanosis and a tendency to coldness of the extremities; the stomach is brachymorphic and hypersthenic, the bowels are constipated; the blood shows characteristics of hypoevolutism with modifications of lymphatic-chlorotic type, and is poor in normal antibodies. There is habitual hypoglycemia, with great tolerance for carbohydrates. There is also a tendency toward the accumulation of water and chlorides in the tissues, with slow oxidation and slow elimination of products of protein metabolism, frequently causing rheumatoid pains of a toxic nature in the ligamentous, muscular and articular tissues; headache and early arteriosclerosis are rather frequent. Adipogenesis is exaggerated and basal metabolism diminished. From the functional angle there are slowness and torpor of all organic reactions, and a low sympathetic tonus with a relative preponderance of the vagus.

In the psychic field we find apathy (the apathetic temperament of the ancients) and slowness of all psychic processes. The intelligence is hardly ever completely evolute, almost never of high grade, more often below the average except in cases of mixed hyperthyroid and hypothyroid temperament. There is premature aging of the whole organism with great tolerance for iodine preparations, thyroidin and adrenalin.

HYPERPITUITARY CONSTITUTION.

From the morphological aspect the stature is higher than the average, with marked strength of the long bones and exaggerated development of the trunk as well as of the extremities, but with relative excess of the latter over the former. The distal parts (face, hands, feet) are characteristically large, massive and thick. In the face there is an exaggerated development of the pneumatic cavities with an accentuation of the bony prominences and of the supra-orbital ridges. The mandible is long and thick, the teeth are large, often with wide interdental spaces. The ends of the hands and feet are large, and the phalanges show pronounced tuberosities. There is a thick, oily skin with conspicuous openings of the sebaceous glands. The hair on the trunk and extremities is coarse and abundant, but that on the head is usually scanty on account of seborrhea. There is a tendency to cutaneous pigmentation, and the mucous membranes are rich in connective and lymphatic tissue, with a tendency to hyperplastic sclerosis. The development of the external genital organs often exceeds the average, and in women there are signs of masculinism in the face, hair and voice. The muscles are strong and hypertonic, and the connective and ligamentous tissues are very well developed. There is but little subcutaneous fat and the subject presents a lean appearance. The heart and arterial system are well developed, and there is a tendency to tachycardia, hypertension and arteriosclerosis. Intestinal hypertonia and hyperperistalsis are frequent. There is low tolerance for carbohydrates. According to Brugsch there are increased purin values of the blood and increased saline secretion of the kidneys (increased power of concentration on the part of the kidney). The basal metabolism is also increased, according to Englebach. The orientation of the vegetative nervous system is chiefly sympathicotonic. There is a tendency to psychic unrest due to mental excitement and hyperemotivity, but with dominion of logic over passions. The intelligence is usually well developed. The sella turcica is, as a rule, larger than the average, but may occasionally be small and deformed, or of normal size. Englebach found that the intestinal reaction to hypophyseal extract is occasionally increased (ready hyperperistalsis).

HYPOPITUITARY CONSTITUTION.

In infancy there is in both sexes a general deficiency of stature and growth, with exaggerated adiposity and defective development in length and thickness of the bones both in the trunk and in the extremities, but especially in the former. There is a small head, a narrow, pointed nose of adenoid type, irregular dentition, overlapping of teeth in the mandible, which is small and retreating, with a pointed chin which is often concealed by an accumulation of fat. The mouth is narrow, circular in shape with thin lips. The eyes are either too close together or too far apart, with round orbits, sometimes of the mongoloid type, with flat supra-orbital margins and scanty eyebrows. Nasal respiration is often difficult, owing to stenosis or adenoid growths. The hands are small and conical with slender phalanges without tuberosities and with pointed tips (observable by means of the roentgen-rays). In males the external genital organs are small, often appearing as though imbedded in a cushion of fat which infiltrates the mons veneris, and in some cases there is cryptorchidism. There is a predilection for fatty deposits in the mammary regions and on the abdomen, arms and thighs, and the general style of the body is feminine, a fact which is especially noticeable in early childhood. The intellectual development is slightly backward, and the character is capricious. In adolescents and adults of both sexes we find persistence of the puerile or prepuberal proportions of the skeleton (slight excess in length of the lower extremities). We meet Stiler's asthenic habitus with marked atonia and relaxation of the articular ligaments (hyperextensibility of the articulations), and an especially feminine type of skeleton and bodily form. Hence in males we find a delicate face, a flattening or rounding-off of bony prominences, a small mandible with pointed chin, large upper incisors, canines shaped like the incisors, a small, pointed nose, scanty eyebrows, long, delicate, silky hair, a large pelvis and abdomen, and the presence of genu valgum. The pubic hair is of feminine distribution, and there is abundant subcutaneous fat, likewise of feminine distribution. The breasts are hypertrophied. There is no hair on the trunk or extremities, but the face has a light growth of downy hair of fetal type. The hands are small, conical and feminine, with delicate nails without lunulæ. The external and internal genital organs are hypoplastic and the sexual activities greatly reduced or lost. In the female there is hypotrophy of the breasts, the secondary sexual characteristics are incomplete, with a tendency in some cases to masculinism; there is a disposition to amenorrhea, dysmenorrhea, sterility and poor fecundity and to sexual frigidity.

In both sexes we find muscular asthenia, intestinal stasis, vagotonia, low blood-pressure and a slow pulse; psychic torpor, apathy, mental puerilism, lack of concentration, occasionally impulsiveness and deficient moral sense. Carbohydrate tolerance is increased. There is a tendency to hypothermia, diminished specific dynamic action of the food (R. Plaut) and a tendency to obesity. The elimination of uric acid and the purin content of the blood are diminished, while the elimination of water by the kidney is increased (polyuria). The sella turcica is small. There is a diminished intestinal reaction to the injection of hypophyseal extract (Englebach).

HYPOADRENAL CONSTITUTION.

By this we understand a constitution characterized by the dolichomorphic microsplanchnic habitus, with hypoplastic trunk, slender, long bones, habitual leanness and cachexia, marked developmental deficiency of both skeletal and smooth muscles, a tendency to visceral ptosis, an accentuated universal lymphatism with or without hyperplasia of the thymus, hypoplasia of the heart and arteries, marked arterial hypotension, frequent fainting spells, lymphocytosis and occasionally eosinophilia, hypoglycemia and hypocholesterinemia, hypotrophic skin with increased pigmentation, especially on the exposed parts of the body, and often a great abundance of pigmented moles. From the psychic point of view, there is a tendency to depression, melancholia and pessimism, with affectivity and sensitivity to grief often much exaggerated. The intelligence is normal or even supernormal (if hyperthyroidism coëxists).

HYPERADRENAL CONSTITUTION.

This is an apoplectic habitus with muscular overdevelopment and hypertonia, marked muscular strength, blood-pressure above the average with a tendency to hypertrophy of the left portion of the heart, hypertonic peripheral arteries, hypertrichosis, hyperglycemia and hypercholesterinemia. This type has great moral and intellectual energy, and presents the picture of euphoria. In the female there is general tonic adiposity with hirsutism or a wealth of hair of masculine type and premature sexual development, with a tendency to dissociation of the sexual characteristics and to masculine character (see page 207, the syndrome of *precocious matronism.*)

HYPOPARATHYROID CONSTITUTION.

By this (although in a very hypothetical way) modern authors mean the constitution characterized by spasmophilia or by a tendency to phenomena of hyperkinesis and hyperreflexia of the striated as well as the smooth muscles, with electric or mechanical hyperexcitability of the motor nerves, sensory hyperexcitability and hyperexcitability of the vegetative nervous system, alike of the sympathetic and parasympathetic. In these constitutions we sometimes find a poverty of enamel on the incisors, or these teeth break readily or fall out. We observe a tendency to rickets in infancy, anomalies of calcium metabolism and a disposition to alimentary glycosuria. A diminution of calcium and an increase of phosphates in the blood seem to be characteristic. The hypoparathyroid constitution is often found associated with the hypopancreatic, which is essentially characterized, so far as we can tell today, by a diminished tolerance for carbohydrates, from which there is a ready transition to true diabetes, mild or grave.

HYPERTHYMIC CONSTITUTION.

According to Berman, this constitution is represented in infancy by the *angelic type* of child, well proportioned, pretty, delicate, with transparent skin which colors readily, long silky hair, exceptional grace of motion and an alert mind. These subjects seem to be models of beauty but unfit for the struggle with environment, and they fall easy victims to tuberculosis, meningitis or other infections. After puberty hyperthymics are distinguished by a strong tendency to inversion of physical and psychic sexual characteristics, by the existence in the male of elegant feminine bodily outlines, with wide thighs, a long thorax, rounding pelvis, the soft skin of a child, of an unhealthy opaque white or milky color, little or no hair on the face, in some cases genu valgum and flatfoot. In the female we may find only a soft, delicate skin and nails, a lack of mammary development, little hair, scanty and delayed menstruation and in some cases a certain persistent adiposity and juvenility if there is also hypophyseal insufficiency. Hyperthymic subjects have hypoplastic hearts and arteries and hence insufficient muscular power, and they are exposed to sudden death for all the reasons that produce sudden circulatory imbalance, or to rupture of hypoplastic arteries. On the psychic side we note at once the tendency to homosexuality and to masochism, and then to a certain moral irresponsibility, more or less impulsiveness and incapacity for adaptation to the difficulties of social life, a tendency to crime and suicide! The hyperthymic temperament is rather difficult to distinguish from the hypopituitary, with which it is habitually associated during the puberal period.

These are the endocrine temperaments that have been best studied and individualized up to the present time. We are not yet in a position to give a clear description of the hyperparathyroid, the hyperpancreatic, the hypopineal and hyperpineal temperaments on the basis of serious clinical and experimental data. With regard to dysgenital temperaments, the reader is referred to the chapter on Anomalies of the Genital Apparatus.

CHAPTER X.

PRINCIPLES OF THERAPY OF CONSTITUTIONAL INADEQUACIES.

Social medicine *vs.* prophylactic care of the individual—Ideal somatic and psychic balance the aim of individual medicine—Is it possible to modify the hereditary side of constitution?—The value of stimulative therapy of organs—Reëducation and rational gymnastics—The "educative moment" for an organ—The principle of functional economy—Protection from abnormal stimuli—Organotherapy—Endocrine hygiene—Treatment of criminal tendencies by acting on individual hormonic formula—Reconstructive tonics as endocrine regulators—Eugenics and prenatal care—The biotypogram, a somatic and psychic constitutional formula.

If the supreme aim of clinical medicine is the cure of disease, the ultimate goal that constitutional medicine contemplates can be none other than the *cure of the soil,* the prophylaxis, the taking of measures to strengthen the organism and to reinforce weak or anomalous organs, to the end that exogenous disease agents may not succeed in getting a foothold or overcoming the resistance of our cellular condition. "*L'on tombe par où l'on penche,*" the French clinician Peter used to say. To avoid this fall of the individual into that state of disease to which his *internal destiny,* his constitution, is dragging him is the lofty task that we propose to undertake through the study of constitutional anomalies and inadequacies.

Hitherto the hygiene and prophylaxis to which we have turned our attention have been *hygiene and prophylaxis of the community.* Over against this *social medicine,* which seems to us to have but a very limited success in saving the *individual,* we place, as more indispensable, the *prophylactic care of the individual,* even while wishing to make the latter work in unison with collective medicine and march side by side with it. Individual medicine, unlike collective hygiene, aims to apply to each individual, after a thorough preliminary study of his somatic and psychic personality, all the methods available to modern therapy, in order to strengthen the weak points of his bodily fabric and his psychic make-up.

Only such an individualistic trend of preventive medicine can lead to important practical results, since it is only by seeking to improve the somatic-psychic personality of the separate individual units that we can succeed in bettering the social organization.

What clinician does not know that the same hygienic advice, of, let us say, sea air or mountain climate or medical gymnastics, etc., does not *per se* fit all individuals of weak constitution, but that he must always look over the ground and find out which treatment is required by each individual? The hygienist and champion of social medicine must never forget that he is first of all a physician, and the modern physician, like our good father Hippocrates, can only be an *individualistic and constitutional physician.*

The fact is worthy of reflection that, in this high mission of strengthening and augmenting resistance, of prolonging life and youth, of elevating the organism ever more and and more toward the ideal somatic and psychic balance, toward happiness of body and soul, the modern physician pursues a goal which seems the reverse of that followed by Nature with regard to the human and all other species; for Nature is niggardly toward the individual and is little preoccupied about his health except in so far as and as long as this is necessary for his contribution to the preservation of the species (after which, he goes rapidly toward death); but we, on the contrary, put up a struggle for the individual in order to secure for each one the greatest physical and psychic well-being within the limits assigned by the iron laws of heredity, which, as has been said, dominate the individual constitution.

Now is it ever possible to wage a successful warfare against the laws of heredity, to modify the hereditary side of constitution? Here we must recall what we have already clearly stated about the general concept of constitution, namely, that the *potentialities*, the *tendencies*, the germs of the constitutional characteristics are hereditary, but that every concrete trait, every reality is also of necessity *conditional*, and is subordinated, in its appearance upon the scene, to determined external conditions. And it is precisely upon these conditional factors that we can act, by inhibiting the appearance of certain unfavorable tendencies or by encouraging the development of those hereditary tendencies that seem most advantageous to the individual's somatic and psychic resistance.

Naturally we are only upon the threshold of the scientific attempts in this titanic struggle of man against his internal destiny, which is wrapped up in the chromosomes, bearers of the hereditary genes or potentialities—a destiny which, within limits that vary it is true for different individuals, is yet almost without exception ruthless to all, since we already know the more or less heavy burden of hereditary organic inadequacies every individual brings with him at birth. Nor may we deceive ourselves by believing that we are always completely victorious in this struggle.

But it is goal enough for us if we succeed in prolonging the duration of a life menaced prematurely by an hereditary vital weakness, and in freeing such a life so far as possible from physical and moral sufferings, convinced as we are that such greatly coveted human happiness has its roots in the functional harmony of body and soul, so that this also, like health, is a problem of individual prophylaxis and somatic and psychic therapy.

In order to strengthen organisms that are affected by constitutional weakness, we must have recourse to the great directing principles of *stimulative training* of the miopragic organs, functional reëducation and *rational gymnastics* of the organic apparatus, with a view to carrying their small range of functional excursion to the farthest limits possible. The principle of training, for example, was applied during the World War to constitutionally weak hearts with excellent practical results, and it is a matter of common knowledge that by training we can succeed in rendering as powerful as those of a real athlete the constitutionally hypoplastic and hypotonic muscles of a subject with dolichomorphic or asthenic habitus, in developing and widening a contracted and paralytic thorax, etc.

In this training of the organs we must never lose sight of the unitary principle of constitution, that it is impossible to act upon one organ or apparatus without taking account of the condition of other parts of the body that are in intimate anatomical and functional correlation with that organ. We must consider this especially when we are dealing with weak organisms in process of development, so as not to provoke artificially a state of imbalance and disharmonies of growth, thus effecting an exaggerated development of one part at the expense of other parts, and transgressing those great laws of normal growth which have been so well studied by Godin under the name of *laws of alternation*. This author, a diligent and original student of human growth, has shown that every organ, according to its development and possibilities, has an "*educative moment*," a phase of longer or shorter duration, in which if we take pains to prepare it, the organ offers a condition of educational receptivity.

For instance, the moment of the brain occurs in the prepuberal phase when the brain has become almost adult from the point of view of its quantitative growth and is still free from the influence of stimuli which, at the onset of puberty and thereafter, arise from mature sex glands. Before puberty, says Godin, during the *agenital life* the psychic activity is entirely in abeyance because the germinative tissue is unawakened and the brain is in possession of all its cells, which have only to become hypertrophied. It depends upon education whether this cerebral hypertrophy becomes a wealth or a poverty, a benefit or a menace to the community as well as to the individual.

Another great principle of individual prophylaxis and of the treatment of organic miopragia which we must adopt when training is not possible or produces no noticeable results is that of *functional economy*. This principle consists in not imposing greater labor on an organ than it can perform, but in seeking, on the contrary, ever to augment its reserve of energy by relative repose, and thus to prevent habits of ill-regulated living, out of proportion to the capacity of the functional effort of the organs, from ever dragging these organs into a condition of pathological decompensation. For example, in an individual in whom the pancreas is constitutionally inadequate and the tolerance for carbohydrates low, we seek by limitation of alimentary carbohydrates to save as much energy as possible for the pancreatic gland, so that it may be strengthened in its antidiabetic hormonic function and the tolerance for glucose be raised. We apply the same method of economy of effort and limitation of functional consumption in cases of hypoplasia of the heart and arteries which cannot be corrected by training, and in cases of hereditary and familial renal weakness.

A third principle which has the same aim of avoiding the premature wearing out and exhaustion of the already poor nutritive and functional reserve of a constitutionally weak organ is that of protecting it from all those abnormal stimuli—toxic, physical and psychic—that may electively damage the organ itself.

Thus, in the case of an individual with constitutional inadequacy of the liver or of the arterial walls, it is necessary to cut out alcohol, tobacco, etc., poisons which might so easily determine processes of sclerosis of the liver and of the vessel walls. It is here that the choice of the alimentation best suited to each individual is of special importance according to its digestive and assimilative potentialities, the anomalies of its organic metabolism, its alimentary idiosyncrasies or intolerances.

Finally, we can, up to a certain point, undertake to correct constitutional anomalies by means of organotherapy, and especially by seeking to act upon the system which is the regulator, *par excellence*, of the trophic and functional equilibrium of the organism—the endocrine system. This system can be influenced not only by means of opotherapy or administration of glandular extracts, continued over a long period of time and applied with care and intelligence, but also by means of stimulation, in cases of insufficiency, or reduction, in cases of hyperactivity, of the individual endocrine glands through the use of other procedures, such as roentgen-rays and radium (which are able to modify even the hereditary quality of the sex cells), electricity, climate and particular diets having an elective action on certain glands. Last of all, it is possible that the best results along these lines may be obtained in the future through the practice of glandular grafting.

Endocrinotherapy will find its application mainly in the *endocrine phases* of life, those related to the periods of growth, to puberty, menstruation, pregnancy, lactation and menopause. It is here that this new branch of therapeutics, of such great promise, will achieve its greatest successes, through the correction and prevention of constitutional imbalances that appear so readily at these periods of life.

Modern investigations show the possibility of prolonging the phases of youth and retarding old age by means of endocrinotherapy and endocrine hygiene. From this point of view I believe that functional economy in sexual expression is of greater benefit than grafting of the genital gland or provoking increase of the genital hormonic function (Voronoff-Steinach). Clinical observation has taught me that an exaggerated and prolonged exercise of the sexual function anticipates the changes that come with senility, especially sclerosis of the cerebral arteries and kidneys, perhaps because the abuse of the sexual function consumes to excess and prematurely exhausts the secretion of the thyroid gland, which is the real gland of youth.

The study of the various endocrine temperaments also raises the question whether it may not be possible to prevent and to treat anomalies of character and criminal tendencies by acting upon the individual hormonic formula.

In connection with endocrinotherapy in the treatment of constitutional inadequacies, we may here point out that it is not improbable that certain substances often used in medical practice as so-called tonics act upon the organism through the endocrine glands by stimulating and regulating their functions, or they may act in collaboration with the hormones, of whose molecule some of these substances form a part. We wish to call attention especially to the four great substances that have a true reconstructive action—*iodine, iron, phosphorus and calcium.* We know that iodine forms part of the molecule of thyroxin, the active principle of the thyroid, and is *par excellence* the element that stimulates the basal metabolism and the morphological evolution of the body. Iron is intimately related to the genital and splenic hormones, and through the pathway of the hemoglobin is the indispensable element for the absorption of pulmonary oxygen and possibly also for the storing up of the energy of the actinic rays of sunlight. Phosphorus enters into the molecule of the adrenal, the lutein and, especially, the hypophyseal lipoids, and is *par excellence* the regulating element of the metabolism of tissues rich in phosphoric fats (brain, blood, germinal cells) and of the metabolism of the cell nuclei in general. Finally, calcium is in intimate functional relationship with the parathyroid and thymus hormones, and is *par excellence* the element regulating the irritability of living substance, especially the neuro-muscular excitability, besides being an indispensable element for the solidity of the skeleton; in other words, it is the *conditio sine qua non* for the proper functioning of the neuro-musculo-skeletal apparatus of movements.

The wise association of these four great mineral elements of living matter with hormonic therapy is capable, according to my experience, of giving far better results than simple opotherapy.

Lastly, eugenics and prenatal care of the child will seek to limit as much as possible the harmful influences exercised by constitutional anomalies of parents upon the constitutions of their offspring, by preventing the former from procreating when they are suffering with status degenerativus to a serious degree or with chronic diseases (also from procreating at an age either too young or too advanced); by taking care that diseases and intoxications of the mother during the entire period of gestation shall not have, through the placenta, an ill effect upon the development and constitution of the product of conception. In this prenatal care, too, it is possible that we may successfully use endocrinotherapy to direct and regulate in the most appropriate manner the various phases of ontogenesis, when such regulating action on the part of the maternal endocrine glands seems insufficient or is replaced by an inhibitory action.

Individual prophylaxis, or the reclaiming of constitutions that are weak in body and mind, will enter upon its phase of definite practical realization the day it becomes possible for every individual at any period of his life to have a complete *somatic and psychic constitutional formula* recorded from time to time in a suitable *individual book of health;* that is, it will then be possible to know the *biotypes* and to establish an individual *biotypogram.*[1] But the periodic examination of so-called healthy subjects, performed with all the resources of constitutional semiology, and the application, to those who appear tainted and those who are leaning toward disease conditions, of all the resources of constitutional therapy require enormous means, which can only be procured in large institutions devoted to the advancement of scientific research with a view to understanding and reclaiming the individual personality. In the interest of the individual and of the nation such institutes should be created without further delay in countries that claim to be in the vanguard of civilization.

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[1] We propose these two terms to signify, respectively, the type of the individual personality and the formula or diagrammatic representation that expresses it.

APPENDIX TO THE ENGLISH TRANSLATION.

CHAPTER XI.

MODERN ANALYSIS OF THE INDIVIDUAL HUMAN BIOTYPE.

The biotype Biotypology, the doctrine of constitutions, temperaments and characters—The correlational, the only sound method of modern analysis—Lines of orientation—Morphological aspect: The absolute development of the bodily mass; the proportional development of the vegetative and animal systems; the proportional development in length and breadth of the body; the tonus of the bodily form—Neurochemical aspect: Metabolic, endocrine and neurovegetative orientation; the energy of nervous reactions and of the functions of the various organs; velocity of functional reactions—Psychological aspect: Energy or resistance of the various psychic functions; their velocity; development of the instinctive, affective and intellective life; special aptitudes; development of the total intelligence—Outline of the anabolic and the catabolic biotype—Analysis of the anabolic biotype on the basis of the greater hydrophilia of its colloids.

As I have already shown, the three fundamental concepts of the ancients of *constitution*, *temperament and character*, along with the modern unitary constitutional trend (morphological-physiological, biochemical and psychical) deserve to be brought together under the single inseparable concept of individuality, which I liken diagrammatically to a triangular pyramid, the base of which encloses the hereditary patrimony of the individual (the *genotype* of certain authors); from the three sides of this there arise three faces intimately connected at their corners—the morphological face, or habitus; the psychological face, which includes the character plus the intelligence; and the neuro-chemical face, or that neuro-chemism which regulates all the vital functions, dominated by the synergy and interrelation of the hormones with the nervous system. These three faces of the pyramidal figure of the individual meet in the apex, which is the functional and vital synthesis of the individual, a synthesis to which I have given the name *biotype* or *vital type*.

I believe that the term *biotype*, to express the somatic-psychic individuality, is necessary if we are to avoid the endless diatribes between the supporters of the science of constitutions according to the narrow concept of Tandler, who reserves the term constitution to the complex of hereditary characteristics (genotype), and other authors who understand by constitution, in a clinical sense, the whole complex of individual characteristics, inherited, congenital, or acquired very early, during the formation of the somatic and psychic fabric; also if we are to avoid the discussions of those who would use the term constitution only in the sense of a complex of morphological factors without including functional factors, or of those who would confine the use of this term to the complex of somatic characteristics without including psychic ones as well. The human vital type or biotype necessarily includes within itself the whole *individuality differential*, as Loeb would say; all the individual differences of vital manifestation, since these in their ensemble constitute a *type* aside from any consideration as to whether they concern the somatic or the psychic sphere, whether they are hereditary or conditional, that is to say, whether they are or are not due to influences of the environment upon the actuation of the structural-functional hereditary plan of the individual.

For the science which is concerned with these human individual biotypes I have proposed the term *biotypology*, that is, the doctrine of constitutions, temperaments and characters.

Modern analysis of the individual biotype cannot be made today by any other method than the clinical, that is, the *correlational*. It must be dominated by the principle of correlations between the morphological, the humoral and the psychological side of the individuality. It is no longer possible, therefore, for the philosopher, or the psycho-pathologist, or the physiologist, as is still attempted, to continue to give his attention to only one fragment or one face of the human biotype without sounding the depths of the other faces of the individual unit (which is not always an easy matter for students who are specialized for a single given line of study).

Etiology, or the science of human characters, the so-called occupational psycho-physiology, directed toward the orientation and choice of a profession, cannot, for instance, be of any value apart from the polyhedral guidance of general clinical medicine, which is the only guide today adapted for the exploration, in their mutual genetic relations, of external and internal morphological characters, of functional, biochemical and neuro-psychical characters, from the synthesis of which, as has been said, the complete human biotype is obtained.

It is not my intention to set forth here, in minute detail, the whole individualistic semiology, but merely to trace the lines of orientation which must be followed in practice if we are to be able to define in synthetic terms what we may call the *individual biotypological formula.*

Beginning with the morphological aspect of the biotype, we must at least fix the following points:

(*a*) The absolute development of the body mass, that is, whether the individual is normosomic, hyposomic or hypersomic.

(*b*) The proportional development of the vegetative and the animal system (Viola's principle), that is, whether the individual is a normosplanchnic-normovegetative, a microsplanchnic-hypovegetative, or a megalosplanchnic-hypervegetative subject. With regard to the vegetative system it is necessary first to determine the absolute development, and then the relative development of the lungs, heart, digestive tube, blood and sexual apparatus; with regard to the animal system, the development of the skeleton and muscles, the skin and cranium.

(*c*) The proportional development in length and in breadth of the body, that is, whether the individual is eumorphic, dolichomorphic or brachymorphic in his general bodily structure as well as in the limbs, thorax, abdomen and cranium.

(*d*) Lastly, the *tonus* of the bodily form, that is, whether this has a drooping and flaccid or atonic appearance, a hypertonic and erect appearance, or one that is eutonic.

Passing to the neuro-chemical aspect of the biotype, we must seek to determine the following data:

(*a*) The metabolic orientation: Relative weight of the body, ready variation or stability of the weight itself, basal metabolism and the existence of anabolic or catabolic types.

(*b*) The endocrine orientation (Pende): The endocrine formula and the individual dominant endocrine; the various endocrine types or temperaments.

(*c*) The neuro-vegetative orientation: The nervous vegetative equilibrium or disequilibrium; the existence of a general or partial parasympathicotonic orientation, or one that is sympathicotonic, or polytonic, or hyposympathicotonic, or hyposympathico-parasympathicotonic.

(*d*) The energy of the nervous reactions and of the functions of the separate organs: whether the individual is neuro-hypersthenic, neuro-hyposthenic or neuro-orthosthenic; whether he is hyperpragic, hypopragic or eupragic.

(*e*) The velocity of functional reactions: whether the individual is *tachypragic, bradypragic* or of normal functional velocity.

Naturally the judgment with regard to these various humoral and dynamic characteristics of the biotype cannot be more than relative to the state of modern semiology and to its numerous gaps and uncertainties; it can only be a judgment as to orientation.

This is especially true for the definition of the psychological aspect of the individual biotype, for which I make use of the following fundamental observations, which can, I believe, taken as a whole, give us a much better orientation with regard to the complete psychic personality of the subject than the ordinary mental or performance tests alone, which are often unreliable.

(*a*) The energy or resistance of the various psychic functions (the subjects being psycho-hyposthenic and psycho-labile, or psycho-hypersthenic and psycho-stabile, or normal).

(*b*) The velocity of the psychic functions (subjects tachypsychic, bradypsychic or normal).

(*c*) The development of the instinctive life.

(*d*) The development of the affective and moral life.

(*e*) The development of the intellective life in the relations of imaginative or fantastic thought, of concrete-realistic thought, of logical-abstract thought.

(*f*) The special aptitudes and vocations of the subject.

(*g*) The development of the total intelligence.

We cannot here take time to discuss the technique (which is only in its beginnings) of this psychological examination. Suffice it to say that the technique may be different according to the individual observer, the sole requisite being that it shall lead to the deepest possible penetration of the psychic life of the subject, in both his quantitative and his qualitative development.

Modern analysis of the individual biotype, carried out with this correlational scope, has already given quite promising results, as is shown by the studies of Kretschmer, Naccarati and others with regard to the relation between the individual morphology and the character or intelligence, and by my own studies and those of L. Lévi and others with regard to the relation between the individual endocrine formula and the morphological-psychological type.

It is, I believe, now becoming more and more possible, as I have elsewhere affirmed, to place the entire analysis and interpretation of human individuality upon the fundamental principle of rhythm and anabolic-catabolic balance of material metabolism. It is upon this orientation of the metabolism of matter and energy, which varies with the individual, not only in the organism considered as a whole but also in the separate organs and tissues, that both the functional orientation of the organism in its entirety and of its organs and tissues and also the psychic orientation and character depend.

We can already conceive and in part demonstrate equations such as the following:

(*a*) Anabolic biotype = megalosplanchnic brachymorphic biotype = bradytrophic, bradypragic, hyperpragic biotype = neuro-psycho-hypersthenic and psycho-stabile biotype = predominantly parasympathicotonic biotype = predominantly hypothyroid-hypopituitary or hypothyroid-hyperadrenal or hypothyroid-hypergenital biotype.

(*b*) Catabolic biotype = microsplanchnic dolichomorphic biotype = tachytrophic, tachypragic, hypopragic biotype = neuro-psycho-hyposthenic and psycho-labile biotype = predominantly sympathicotonic biotype = predominantly hyperthyroid-hyperpituitary or hyperthyroid-hyperthymic or hyperthyroid-hypoadrenal or hyperthyroid-hypogenital biotype.

And we shall be able to add, according to Kretschmer, Naccarati, Vidoni and others, a greater frequency of the cycloid character in the anabolic type and of the schizoid in the catabolic type, and of optimism in the first and pessimism in the second.

Naturally these equations refer to the two *pure* and *harmonious* fundamental human types, and not to the numerous mixed or hybrid or crossed types.

The study of the intimate vital mechanism in the two antithetic human biotypes, strengthened by modern knowledge of the autochthonous *neuro-chemism* of the tissues and of the *neuro-chemism* that regulates the correlations between the various tissues (ions, hormones and their relations to the neuro-vegetative system), demonstrates a remarkable interdependence of function, metabolic orientation and psychism in the individual.

Thus, according to MacAuliffe, the *heavy* type (our own anabolic-hypervegetative-brachymorphic-megalosplanchnic type) owes its broad form to the greater hydrophilia of its colloids, to the greater aqueous swelling of its protoplasm. This greater hydrophilia must be related in its turn, as is assumed, to a special equilibrium of calcium, sodium and potassium ions, which are in their own turn regulated by a special orientation of the parasympathetic and sympathetic (Zondek). Again, such a hydrophilia would explain the greater elasticity and tonicity of the bodily forms, water being a liquid that is almost incompressible. But the greater abundance of water carries with it a *greater surface tension* in the protoplasmic gases of the heavy human type, a tension that is greater the more salts the tissues absorb, since the heavy type must have a strong osmotic power, inasmuch as water is the solvent *par excellence* for the majority of salts. Now, since the surface tension is greater, the gaseous exchanges are accomplished less easily in the heavy type, because the solubility of gases in a liquid is in inverse ratio to its surface tension. Hence in the brachymorphic type oxygen and carbon dioxide circulate less easily, resulting in slower vital reactions and, therefore, in that bradytrophism and bradypragia which I have individualized in the hypervegetative type; there is the same predominance of anabolic over catabolic processes, and the tendency to the accumulation of reserve nutritive materials, resulting in a greater functional robustness, in a hypersthenia in both the osmotic and the psychic field, and in the sensation of an increased *turgor vitalis* or euphoria, with optimism and expansiveness. All these are marks characteristic of the anabolic hypervegetative biotype. I may add that this biotype is rather often, according to my observations, the heavy drinker of water and consumer of salt, with a tendency to hypersecretion (a corresponding elimination of the water introduced in excess) of all the external glands both of the mucosa and of the skin, a true *hypersecretory diathesis* which I regard as one of the most characteristic constitutional functional marks of this biotype, coördinated, as it is often possible to demonstrate, with a predominantly parasympathetic diathesis.

Naturally we meet in the catabolic, dolichomorphic biotype, which is only slightly hydrophile, a wholly antithetic behavior on the part of the colloidal dynamics and the neuro-chemism.

We cannot at this time dwell further upon the possible applications to clinical medicine and to constitutional pathology of these marvelous correlations of facts, which are destined beyond a doubt to penetrate the most difficult problems of somatic-psychic individuality as our knowledge continues to grow.

GLOSSARY.

Abiotrophy.—Premature loss of vitality of certain cells or tissues.
Abulic.—Suffering from loss or diminution of will power.
Acrocyanosis.—Blueness of the hands and feet.
Acrohypothermy.—Abnormal coldness of the extremities.
Acromicria.—Congenital smallness or shortness of one or more of the extremities.
Adipogenetic.—Promoting the formation of fat.
Affective.—Relating to the emotional aspect of the psyche.
Anabolic.—Promoting constructive metabolism.
Angio-ectatic.—Characterized by dilated vessels.
Anidrosis.—Marked diminution or suppression of perspiration.
Asthmogenic.—Giving rise to asthma.
Atelectasis.—An airless condition of the lungs or a portion of the lungs.
Autismus.—A mental condition marked by a tendency to turn away from the outer world and to become self-centered.
Autochthonous.—Originating at the place where found, independently of any external influence.

Blastophthoria.—Degeneration of the germ cells as the result of poisoning by syphilis, lead, alcohol, opium, etc.
Brachymorphic.—Built along lines that are shorter and broader than the normal figure.
Brachyskele.—Having short legs.
Brachytypical.—Same as *brachymorphic*.
Bradytrophic.—Characterized by sluggish metabolism.
Brevilineal.—Brachymorphic.

Calciotropism.—A capacity of cells to react in an exaggerated degree to administration of calcium.
Catabolic.—Relating to destructive metabolism.
Catatonic.—Relating to a form of dementia præcox in which the progressive dementia is interrupted from time to time by maniacal, melancholic or stuporous intervals.
Catalytic.—Relating to chemical decomposition induced by the presence of a body which either takes no part in the reaction or is restored to its original state at the end of the process.
Cenesthesia.—The subconscious sensation caused by the functioning of internal organs.
Cenesthopathy.—Derangement of the normal general sense of bodily existence.
Cholaligenous.—Giving rise to cholalic acid.
Chromaffin.—Noting certain cells found in the medulla of the adrenal bodies and elsewhere.
Chromosome.—A rod-shaped or thread-like body of chromatin in the cell nucleus, which splits longitudinally as the cell divides, one-half going to each of the daughter cells.
Circular.—Relating to the manic-depressive form of psychosis.
Clinostatic.—Related to or caused by the recumbent posture.

Colloidoplasmatic.—Noting the relation of colloids and plasma.
Cycloid.—Tending toward the cyclic or circular form of psychosis, that is, toward the manic-depressive type.
Cyclothymic.—Manic-depressive, noting a form of psychosis.

Despeciation.—A deviation from the average type of a species, in the direction of a degeneration.
Dolichomorphic.—Built along lines that tend to be longer and more slender than the normal type.
Dysendocrine.—Characterized by faulty action of the endocrine glands.
Dyskinesia.—Difficulty in performing voluntary movements.
Dysplastic.—Characterized by the production of an organ or tissue where it does not normally belong.
Dystonia.—A state of abnormal tonicity of the tissues.

Ectype.—A copy of an original type; the opposite of prototype.
Endogenism.—The theory that diseases arise from causes within the body.
Engraphia.—The process hypothecated in the theory that stimuli leave definite traces (engrams) on the protoplasm of the animal or plant which, when regularly repeated, induce a habit that persists after the stimuli cease.
Erethism.—An abnormal state of excitement.
Erythrism.—Redness of the hair and beard, with a ruddy freckled complexion.
Eumorphic.—Noting a form built along normal lines, intermediate between dolichomorphic and brachymorphic.
Euphoria.—A general state of well-being.
Eurhythmic.—Harmonious.
Excito-anabolic.—Causing constructive metabolism.
Excitocatabolic.—Causing destructive metabolism.
Exocrine.—Relating to external secretion of a gland.
Exogenism.—The theory that diseases arise from causes external to the body.

Fibroplastic.—Producing fibrous tissue.
Flavism.—A condition marked by the presence of yellow hair.

Galactosuria.—The passage of urine containing galactose, one of the products of the hydrolysis of lactose.
Gametes.—The germ cells.
Gastrosucchorea.—Excessive secretion of gastric juice.
Gene.—The factor in one or both of the gametes (germ cells) which determines a certain character in the resulting zygote (offspring).
Genotype.—The fundamental constitution of an organism with all its hereditary peculiarities.
Granulocytogenous.—Giving rise to formation of granulocytes.

Habitus.—The general characteristic appearance of the body.
Hemodynamics.—The study of the blood-pressure.
Heterotopic.—Misplaced.
Hyperchromemia.—Anemia associated with a high color index.
Hyperchylia.—Excessive secretion of gastric juice.
Hypercortical.—Characterized by excessive activity of the cerebral cortex.
Hyperevolutism.—A condition characterized by development in excess of the normal.
Hyperidrosis.—Excessive perspiration.
Hyperkinetic.—Characterized by excessive muscular movement.
Hyperorchitism.—Excessive functioning of the testicles.

Hyperpragic.—Characterized by excessive activity.
Hyperreflexia.—A condition in which the various reflexes are exaggerated.
Hypersthenic.—Having excessive tension or strength.
Hyperthermia.—Unusually high fever.
Hypertrichosis.—A growth of hair in excess of the normal.
Hypo-affective.—Deficient in emotional reactivity.
Hypo-evolutism.—A condition in which the bodily development is retarded: hypoplasia.

Impuberism.—The condition of one who has not attained to puberty.

Jactitation.—Extreme restlessness, as of one who tosses from side to side in bed.

Leptoprosopia.—A condition in which the face is narrow and the cranium elongated.
Longilineal.—Having a form built on lines that tend to be long rather than broad; dolichomorphic.
Longitypical.—Same as longilineal.
Lymphatism.—A condition marked by excess in the lymphoid structures.
Lymphocytogenous.—Giving rise to formation of lymphocytes.

Macroskelia.—A condition marked by excessive length of the legs.
Megalosplanchnic.—Having the abdominal portion of the body relatively large in proportion to the thoracic.
Mesenchymal.—Relating to the embryonic mesodermal tissue.
Microgyria.—Abnormal narrowness of the cerebral convolutions.
Microsomia.—Dwarfishness.
Microsphygmy.—Smallness of the pulse.
Microsplanchnic.—Having the abdominal portion of the body relatively small in proportion to the thoracic.
Miopragic.—Characterized by diminished functional activity.
Morphogenetic.—Causing or stimulating growth.
Myesthenia.—Weakness of the muscular fibers.

Nanism.—Dwarfism.
Nanosomia.—Same as *nanism.*
Neurotonogenic.—Giving rise to nerve tonus.
Neurotonus.—The tonus of the nervous system.
Neurotropic.—Having a chemical affinity for nervous tissue.
Normolineal.—Having a form built on normal lines: eumorphic.
Normotonic.—Having a normal tonus.

Oligodipsia.—A condition in which the body does not feel normal thirst.
Oligohemia.—A deficiency in the amount of blood in the body.
Ontogenetic.—Noting the development of the individual as distinguished from the evolutionary development of the species (phylogenesis).
Organicism.—The theory that the various organs of the body have each their own special constitution.
Orthostatic.—Related to or caused by the erect posture.
Orthotic.—Same as *orthostatic.*
Ovulogenetic.—Giving rise to ovules.
Oxalaturia.—The excretion of an abnormal amount of oxalates in the urine.
Oxaluria.—Same as oxalaturia.

Palatoschisis.—Cleft palate.

Parasympathicotonia.—Abnormal irritability of the vagal autonomic nervous system.

Pavor nocturnus.—Night terrors.

Phylogenetic.—Noting the evolutionary development of any plant or animal species: the opposite of *ontogenetic.*

Polypnea.—Deep, labored and rapid respiration.

Ponderal.—Relating to weight.

Puberism.—The presence of puberal characteristics.

Progeria.—A condition characterized by a mixture of infantilism and premature senility.

Prognathism.—Abnormal projection of one or both jaws.

Protopathic.—Noting a system of peripheral nerve fibers furnishing only a low degree of sensibility, as distinguished from the fine degree described by *epicritic.*

Psychalgia.—Mind pain: distress of mind, noted especially in melancholia.

Psychogram.—The visualization of a mental concept.

Schizophrenia.—Dementia præcox.

Schizothymic.—Belonging to the dementia præcox type of psychosis.

Spermogenetic.—Giving rise to semen formation.

Splanchnoptosis.—An abnormal sinking down of the abdominal viscera.

Sympathicotonia.—Abnormal irritability of the sympathetic nervous system.

Tachypragia.—Abnormal rapidity of action.

Tachytrophism.—Rapid metabolism.

Thymicolymphatic.—Noting a condition in which there is abnormality of the thymus and lymphatic glands.

Tonogenic.—Giving rise to increased tonus.

Trichographism.—Production of the phenomenon of goose-flesh by stroking the skin.

Trophoneurosis.—A trophic disorder occurring as a consequence of disease or injury to the trophic nerves of a part.

Turgor vitalis.—The normal fulness of the capillaries.

Typhlomegaly.—Abnormal enlargement of the cecum.

Vagotonia.— Abnormal irritability of the vagal nervous system.

AUTHORS' INDEX

A

Abrami, 99
Adler, 135, 154
Agazzi, 161
Albano, 206
Albu, 179, 180
Almagià, 225
Ambard, 195
Anders, H., 130
Angelucci, 66
Aoyama, 186
Apert, 115, 215
Aschner, 195
Aschoff, 47, 131, 156, 186
Asher, 195
Aubertin, 195
Audrain, 133, 172, 181

B

Babonneix, 215
Bacmeister, 168, 186
Bailey, 195
Barker, 191
Bartel, 95, 96, 117, 118, 120, 151, 169, 179, 189, 205
Bartolotti, 130
Barré, 71
Bauer, J., 18, 24, 28, 29, 30, 33, 66, 86, 88, 115, 116, 117, 119, 122, 123, 124, 131, 138, 148, 149, 157, 168, 173, 197, 213, 214, 215, 218
Bauer, L., 50
Bauer, R., 187
Benedikt, H., 130
Beneke, 57, 60, 84, 88, 90, 103, 109, 111
Benjamin, 102
Bergé, 195
Bergel, 63
Berghinz, 34, 42
Bergmann, 178
Berlinger, 127
Bernhard, 195
Berze, 24
Bezançon, 88
Biach, 213, 214
Bichat, 35
Bickel, 177
Biedl, 123
Bleuler, 76
Blocq, 137
Boldrini, 53
Bollinger, 127
Borchardt, 23, 121, 125, 218
Bouchard, 44, 45, 95, 122
Bounak, 86, 88, 103
Brehmer, 195
Brosch, 120
Bruce, 214
Brugsch, 44, 56, 57, 58, 59, 60, 61, 63, 88, 90, 109, 110, 152, 154, 168, 232
Bucura, 75
Bulcke, 195
Buscaino, 75, 114, 219

C

Caldera, 161
Camus, 195
Canestro, 165
Castellino, P., 66, 94, 227
Ceconi, 186
Chauffard, 131, 186
Chwostek, 188
Ciaccio, 181
Ciauri, 199
Citelli, 161
Citron, 149
Claude, 103
Comby, 94, 98, 100
Czerny, 97, 102

D

Dalla Vedova, 178
De Boers, 74
De Farmachidis, 165
Defaye, 186
De Giovanni, A., 13, 19, 22, 33, 48, 57, 60, 61, 62, 63, 85, 88, 90, 91, 95, 96, 103, 109, 111, 115, 118, 152, 221
De Sanctis, S., 122
De Tullio, 178
Dietlen, 58
Di Guglielmo, 150
Domarus, 197
Draper, 178
Dresel, 176
Dziembowski, 192

E

Edmunds, 225
Einhorn, 188
Eisner, 195
Ellis, Havelock, 75
Englebach, 233
Eppinger, 68, 88, 102, 113, 120, 135, 138, 139, 164, 167, 173, 177, 183, 188, 197
Erben, 71

F

Faber, 156
Falta, 122, 123, 124
Fichera, 103
Fici, 33, 34, 97, 109, 115, 168
Fiore, 226
Fischel, A., 47, 192
Flandin, 186
Flekseder, 188, 195
Fonio, 150
Forel, 24
Fraenkel, M., 226
Frank, E., 71, 74
Frank, H., 150, 242
Freund, 88, 106, 111, 167, 168, 169, 204
Frey, 195

Frey, H., 153
Furno, 199

G

Gagliardo, P., 110
Gauss, 27
Geigel, 57, 58
Gerota, 181
Gilbert, 184
Gilford, 126
Glanzmann, 149, 150
Godin, 34, 36, 116, 238, 239
Goldstein, 75
Golgi, 135
Gottlieb, 176
Gradenigo, 161
Grafe, 67
Grazzi, 161
Grigaut, 186
Groll, 34
Grör, 135, 136
Grote, 54
Guinzburg, 79

H

Halsted, H., 225
Hammar, 120
Hansemann, 125, 126, 154
Hart, 88, 111, 116, 119, 168, 226
Hébert, 116, 125
Hecht, A. F., 69
Hedinger, 119, 189
Hegar, 115
Heilner, 155
Herrmann, 119
Herxheimer, 103
Herz, H., 148, 189
Hess, 68, 88, 102, 113, 120, 135, 138, 139, 150, 164, 167, 173, 177, 183, 188, 191, 197
Heubner, 94, 192
Heyrowski, 173
Hinteregger, 148
Hirschfeld, 151, 189
His, W., 31
Hofbauer, 161
Hoffmann, 103, 153
Hornowski, 119
Hoskins, 225
Houssay, 195
Hoxie, 120
Hunt, R., 225
Hyslop, G. H., 129

I

Iczechowski, 218
Iselin, 226
Iwasaki, 111, 168

J

Janet, P., 216
Jehle, 191, 192, 193
Jendrassik, 212
Jesionek, 135
Johannsen, 21
Jungmann, 195

K

Karplus, 195
Kaup, J., 27, 44, 57
Kelling, 191
Kisch, F., 80
Klemperer, 197
Koch, Richard, 23
Kocher, T., 229
Kolisko, 154
Kollaritis, 216
Kollert, 197
Kraus, F., 19, 27, 60, 94, 153, 169
Krehbiel, 154
Kreidl, 195
Kretschmer, 26, 62, 75, 77, 78, 81, 85, 86, 88, 114, 138, 143, 202, 203, 246, 247
Kreutzfuchs, 154
Kustner, 204
Kwiathowsky, 116
Kyrle, 119

L

Laignel Lavastine, 71, 176
Lauda, 154
Lederer, 112
Lermoyer, 99
Leschke, 195
Levi, Ettore, 49, 125, 213, 214
Lévi, Leopold, 66, 99, 114, 137, 138, 140, 186, 187, 207, 246
Lichtwitz, 196
Lippmann, 154
Livierato, 165
Loeb, L., 19, 244
Lombroso, C., 115, 135
Löwi, 71
Lowy, 212
Löwy, M., 80, 113
Lubarsch, 120
Luthye, 153

M

MacAuliffe, 51, 85, 86, 87, 103, 104, 247
McCarrison, 225, 226
Mamrot, 123
Marañon, 195, 225
Marfan, 161
Martius, 18, 19, 20, 21, 179
Masini, 161
Mathes, 88, 103, 122, 124, 199
Matti, 119
Meyer, 71, 176, 193
Meyer, E., 194, 195
Metchnikoff, 112
Merzbacher, 213
Miloslavich, 181, 182
Minerbi, 71
Mingazzini, 213
Mira, 79
Moebius, 117
Morawitz, 148
Moritz, 58
Moro, 101
Motzfeldt, 195
Mougeot, 69
Müller, E. F., 134
Müller, L. R., 176

N

Naccarati, 66, 79, 220, 246, 247
Naegeli, 62, 91
Nardelli, 137
Nassau, 191, 193
Neste, 120
Neudorfer, 131
Neumann, 111
Neusser, 148, 149, 154, 188, 189, 205
Nicolai, 153
Niemann, 112
Nobécourt, 60
Nowicki, 218

O

Obersteiner, 212
Oehme, 195
Ortner, 148, 154, 155
Oshima, 195
Ostino, 161

P

Pal, 156, 176
Paltauf, 126, 152
Paulsen, Y., 116, 130, 135
Pearson, 29
Pellizzi, 128
Pelnár, 215
Peritz, 125, 145, 178
Perona, 58
Pfaundler, 94, 118
Pick, 213
Pighini, 120
Pincussohn, 196
Pironneau, 126
Pirquet, 169
Plaut, R., 67, 92, 233
Plummer, 230
Polansky, 116
Pollitzer, 111, 187, 191, 192
Popper, 192
Poppi, 161
Potain, 49

Q

Quaranta, 166
Quénu, 181
Quetelet, 27, 28
Quiring, 154

R

Raimann, 193
Rautmann, H., 44, 45
Ravà, 78, 220
Redlich, 218
Reinhardt, 103
Richet, C., 21, 181
Rieder, 188
Ritook, 148
Rokitansky, 103
Rondoni, 212
Rosenstern, 102
Rossi, 58, 59
Rossolimo, 116
Rossle, 131
Rostan, 17
Rothschild, 186, 207
Roussy, 195
Rudolph, 212, 216
Ruffini, 25
Ruggeri, 72

S

Sabouraud, 138
Sainton, 199
Saundby, 194
Schaffer, 205
Schaumann, 150
Schenk, 70
Schlagenhaufer, 151
Schlecht, 149
Schlesinger, 218
Schloss, 213
Schluter, 168
Schmidt, A., 173, 183
Schmidt, R., 103, 112, 116
Schmieden, 179
Schrötter, 158
Schulmann, 195
Schuster, 126
See, G., 158
Selheim, 204
Semon, 24
Senator, 191
Sendtner, 197
Sergent, 72
Sheldon, 79
Sibelius, 214
Sick, 176
Siemens, 23
Siess, 150
Sigaud, 25, 46, 85
Signorelli, A., 184
Smith, 191
Somagyi, 71
Sorgo, 116
Spitzer, 214
Standberg, 138
Stäubli, 102, 149
Steenbock, 226
Stein, 212
Steinach, 208, 240
Stern, E., 116, 135
Stern, R., 66, 114, 212, 213, 217
Stiegher, 150
Stierlin, 195
Stieve, 208
Stiler, 23, 88, 103, 111, 134, 148, 159, 173, 179, 183, 221, 233
Still, 131
Stockard, 88, 103
Stoerk, 118, 148, 149, 150, 179
Strauss, 123, 179, 187
Strümpell, 158
Suess, 116
Szontagh, V., 130

T

Taddei, 184
Tandler, 22, 23, 24, 25, 68, 124
Tedesko, 176
Teissier, 192
Tendeloo, 110, 168
Tinel, 99
Toenniessen, 24
Torrini, 161

V

Variot, 126
Vattuone, 165
Veil, 194
Verocay, 218
Verriotis, 195
Vidoni, 247
Viola, G., 13, 17, 21, 28, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 43, 44, 46, 49, 51, 56, 57, 61, 64, 66, 84, 85, 109, 115, 199, 245
Vollmer, 134
Volpi, 135
Voronoff, 240

W

Wagner, Jauregg, 24
Weber, 123
Weil, 194
Weiss, 154
Wels, 195
Wenckebach, 84, 111, 153 154, 184
Widal, 167, 187
Wiesel, 91, 95, 97, 118, 119
Wiesner, 154
Wolkow, 156

Z

Zak, 136
Zeebe, 153
Zeller, 150
Zielinski, 115
Zondek, 248
Zundel, 123
Zweig, 179

GENERAL INDEX.

A

- Abdomen in megalosplanchnics, 89, 90
  - in microsplanchnics, 103, 106
  - skin of, 141
- Abdominal type, 86
- Abiotrophy, 155, 188, 198, 211
- Acetonuria, 101
- Achylia, 148, 175, 179, 188, 215
- Acrocyanosis, 154
- Acromegaly, 224
- Acromicria, 108, 142
- Adams-Stokes syndrome, 159
- Addison's disease, 135, 163
- Adenoidism, 100, 143, 154, 161 *et seq.*
- Adipogenesis, 141
- Adiposity, 93, 141, 207
- Adrenal cortex, relation of, to gall-stones, 186
    - tumors of, 128, 207
  - glands, 133, 225
  - hormones, 156
- Albinism, 136
- Albuminuria in arthritic children, 101
  - constitutional, 179
  - functional, 148, 149
  - orthostatic, 191, 215
  - physiological, 111, 190
- Alkalosis from atropine, 134
  - in exudative diathesis, 99
  - in megalosplanchnics, 91
- Alternations, law of, 36
- Alternative variability, 28
- Amaurotic idiocy, 213
- Amenorrhea, 109
- Amino-acids, 136
- Anabolic biotype, 247
  - system, 48
- Anabolism, 66, 95, 98, 222
- Anaphylaxis, 99, 181, 187
- Anemia, 179
  - Biermer's, 150
  - pernicious, 131, 150
- Aneurysms, 154, 155
- Angiospasm, 156
- Anidrosis, 138
- Animal nervous system, 35, 114
- Anomalies, autochthonous, 175, 191, 222
  - examples of, 131
  - localized, 129
- Anomaly, constitutional, 20
  - distinguished from disease, 55
  - multiplex, 30
  - nervous, 210 *et seq.*
  - of connective tissue, 131
  - of entire constitution, 20
  - of motor centers, 218
  - psychic, 210 *et seq.*
- Anorexia, 175
- Anthropometry, 34, 53, 57
- Aolan, 134
- Aorta, hypoplasia of, 119, 154, 198
  - in brachymorphs, 91
  - in dolichomorphs, 109 *et seq.*
  - infantile, 153
  - stenosis of, 60, 154, 155
- Aphonia, 165
- Aplasia of nerve cells, 213
- Appendicitis, 182
  - moles in, 135
- Appendix, 181, 182
- Aptitudes, 54, 246
- Arrhythmia, juvenile cardiac, 221
  - respiratory, 153
- Arterio-capillary fibrosis, 157
- Arteriosclerosis, 33, 115, 155, 199, 231
- Arthritics, megalosplanchnic, 99 *et seq.*
- Arthritism, 94, 95 *et seq.*
  - anomalous metabolism in, 98
  - infantile, 98, 100
  - relation to anaphylaxis, 99
  - skin conditions in, 137
  - syndrome of, in adults, 102
  - thyroid instability in, 138
- Articulations, 142, 144, 231
- Ascarides, 182
- Asthenic constititution, 85, 88, 111, 185, 220
- Asthma, 164, 166
- Atavism, 210, 212, 213
- Atelectasis, apical, in adenoidism, 161
- Athletic type, 62, 78, 85
- Atonic variety, megalosplanchnic, 92
    - microsplanchnic, 111
- Atrophy of lymphoid organs, 151
  - of nervous system, 216
  - of skin, 137
  - renal, 198
- Atropine as excitant of vagus, 70
  - intracutaneous effect of, 134
- Auriculo-ventricular conduction, 159

Autismus of schizoids, 76
Autochthonous behavior, 57
  origin, 20
Autointoxication, 149, 172
Autonomic system, 221, 224
Autonomy of parts, 20
Autotonus, 20
Autotoxemia, 95, 98
Axis, cerebrospinal, 222
Azoturia, 185

B

Babinski reflex, 215
Balance, anabolic-catabolic, 246
  dynamic, 18, 36, 216
  endocrine, 67, 68
  endocrino-sympathetic, 227
  humoral, 181
  morphological, 18, 36
  nutritive, 112, 169
  somatic and psychic, 237
Baldness, 138, 230
Basedow's disease, 161, 164, 169
    in dolichomorphs, 114
    predisposition to, 135
Bichat's two systems: vegetative and animal, 35
Bile ducts, 185
  pigments, 185, 188
Bilirubin, 185
Binomial law of Quetelet-Gauss, 27
Biochemistry of the individual, 67
Biometric averages, tables of, 42
Biotype, 56, 242, 243 *et seq.*
Biotypogram, 242
Biotypology, human vii, 27, 46, 244 *et seq.*
Bipolar variability, 28
Blepharitis, 89
Blood, anomalies of, 147, *et seq.*
  calcium deficiency in hypoparathyroidism, 99
    elimination of, 197
  count, 62 *et seq.*
  crasis, 20
  hypoevolutism of, 63, 113, 120, 193
  in arthritics, 102
  in megalosplanchnics, 91, 93
  in microsplanchnics, 108, 110, 113
  intra-abdominal, 184
  phosphate ions, 99
  potassium, 99
  sugar, 110, 193
Blood-pressure, 92, 93, 109, 229, 231
Bones. *See* Skeleton.
Bone-marrow, 147
Bouchard's anthropometric tables, 45
Brachycephaly, 89
Brachymorphic ectype, 36, 46, 55, 84 *et seq.*, 88, 166, 245 *et seq.*
Brachymorphism, athletic type of, 93
  characterized by bradytrophism, 95
  endocrine dominant in, 66
  impure subtypes of, 87
  pure type of, 88 *et seq.*
  synonyms for, 88
  thyroid in, 66
Brachymorphs, subgroups of, 91 *et seq.*
Bradycardia, 69, 74, 159, 179, 221
Bradypragia, 74, 246, 248
Bradytrophism, 95, 248
Brain, 124, 212 *et seq.*, 219, 220, 227, 238
Breasts, 109, 205, 233
Brevilineal type, 36
Bronchial tree, 166 *et seq.*
Bronchitis, 95, 102, 167
Brugsch's cardiac measurements, 58, 60, 154

C

Calcariuria, 197
Calciotropism, 197
Calcium as a reconstructive, 241
  blood, elimination of, 197
  deficiency of, 99
  increases acidity of urine, 134
  penetrates intima, 155
Calculi, intestinal, 182
  urinary, 196
Calculosis of pancreas, 188
Cancer, antithetic to tuberculosis, 103
  predisposition to, in megalosplanchnics, 174
Carbohydrate tolerance, 68, 231, 232
Carbon dioxide, 248
Carcinomatous constitution, 103
Cardia, 176
Cardiopathia adolescentium, 110, 156, 158
Cardio-vascular apparatus, 57, 61, 152 *et seq.*
  relation, 60
Cartilages, 106, 144
Catabolic biotype, 247
  system, 48
Catabolism, 95, 98, 222
Catarrh, chronic pharyngeal, 102
  eosinophile rectal, 181
  respiratory, 167
Cenesthesia, 72, 175, 219
Cenesthopathy, constitutional, 114, 219
Centers, encephalo-medullary, 164
  intrinsic renal, 195
  parasympathetic, 134
  psychic, 175
  vegetative nervous, 70, 220
Cerebellum, 213
Cerebral cortex, 212
  type, 85

Cerebrospinal system, 209 *et seq.*
Cerebrum, 213
Character, ancient concept of, 243
  cycloid, 247
  epileptoid, 219
  individual, definition of, 26
  intimately connected with temperament, 26
Chemistry, biological, 26
Chilblains, 101
Chloasmas, 135
Chlorides, elimination of, 193, 194
  retention of, 91
Chlorine, 112
Chlorosis, 137, 148, 215, 224
Cholalic acid, 186
Cholaligenous insufficiency, 186
Cholemia, familial simple, 184
Circulatory apparatus, anomalies of, 152 *et seq.*
    hypoplasia of, 119
    in brachymorphs, 90
    in dolichomorphs, 110
  insufficiency, 33
Cirrhosis of liver, 185
Cholesterin, 155, 156, 185
Cholesterinemia, 138
Choroid plexuses, 216
Chromaffin tissue, 158
Chromosomes, 237
Climacteric, 141, 206, 207
Colloidoclasia, 99, 167
Colloids, 99, 247
Colon, 68, 111
  anomalies of, 183
Common duct, 188
Concretions in bile, 185
Consensus partium, derived from Galen and Hippocrates, 18, 19
Constipation, 180, 193
  chronic, 184
  habitual spastic, 69
Constitution, analysis of, 67
  ancient concept of, 243
  anomalous, 30
  apoplectic, 103
  as destiny, 236
  asthenic, 23
  carcinomatous, 103
  compared to a pyramid, 26, 83
  correlational principle in, 18, 20
  criterion of, triple, 26
      dynamic-humoral, 64
      morphological, 56
      psychological, 74
  definition of, 25
  determined at conception, 24
  differentiated from disposition, 22
  difficulty of defining, 17
  dolichomorphic asthenic, 184
  endogenous and exogenous origin of, 24, 25
Constitution, essence of, 20
  hydropic, 102
  hypoplastic, 23, 134, 188
  includes temperament and character, 25
  individual psychic, 74
  infantile, 98
  local pulmonary, 130
  manic-depressive, 76
  microsplanchnic hypovegetative, 103
  modern German school of, 19
  normal variability of, 27
  organic concept of Martius, 19, 20
  orientation of, 245
  relation of to temperament, 18
  a resultant, 19
  Rostan's view of its problem, 17
  schizothymic, 76
  strength of, based on harmony, 32
  Tandler's idea of, 22
  thymico-lymphatic, 23
  total of Viola, 21
  two great ectypes of, 36
      megalosplanchnic, 84
      microsplanchnic, 103
  unitary concept of, 19, 56
Constitutional doctrine, De Giovanni originator of, in Italy, 19
Coördination of parts, 19
Correlational method, 244
Correlative origin of constitutional properties, 20
Cortex, adrenal, 128, 186
  cerebral, 212
Coryza, 100
Cretinism, 161, 212
Criterion of constitution, dynamic-humoral, 64 *et seq.*
    morphological, 56 *et seq.*
    psychological, 74 *et seq.*
Cryptorchidism, 120, 203, 205, 217, 232
Cycloid type, 75, 76

D

De Giovanni, constitutional doctrine of, 19
  morphological combinations of, 85
Dementia præcox, 117, 212
Depression, psychic, 185
Dermographia, 72, 113, 219
Despeciation, 115
Dextrocardia, 152
Diabetes, 91, 179, 187 *et seq.*, 193, 224
  insipidus, renal, 194
Diaphragm, 184
Diarrhea, 179, 183
Diathesis, arthritic, 165, 187, 227
  cholesterin, 186
  colloidoclastic, 99, 167

Diathesis, definition of, 31
  dysglandular, 164
  endocrino-sympathetic, 189
  exudative, 97 *et seq.*, 112, 149, 181, 187, 192
  fibroplastic, 95, 118, 156, 182
  glandular, 227
  glial, 217
  hypertonic, 156
  hypersecretory, 248
  hypothyroid, 219
  lithic, 196
  lymphatic, 181
  neoplastic, 103
  neuro-arthritic, 172, 181
  neuropathic, 179, 209
  nervous vegetative, 188
  oxalic acid, 197
  parasympathetic, 248
  psychopathic, 209
  sclero-atrophic, 118
  Stäubli's eosinophilic, 102
  vagotonic, 102, 149, 181
  vegetative nervous, 159
Decussation, 214
Degeneration, progressive lenticular, 217
  psychic, 116
  somatic, 115
Degenerative stigmata, 115 *et seq.*, 179
Digestive apparatus, 111, 112, 171 *et seq.*
  type, 86
Disposition, asthmogenic, 166
  familial, to tumors, 131
  individual, 22
  localized, 130
  not identical with constitution, 21
Dissociation of consciousness, 216
  psychic, 75
  psycho-sexual, 202
Dolichocolia, 183
Dolichomorphic ectype, 36, 46, 47, 55, 57, 62, 67, 79 *et seq.*, 85, 86, 103 *et seq.*
Dolichomorphism, hyperthyroid type of, 65, 107
  hypogenital type of, 108, 109
  hypovegetative, 86
  impure subtypes of, 87
  of heart, 60
  pure type of, 65, 66, 113
  relation to pulmonary tuberculosis, 87, 110, 114
  thoracic, 168
Dolichomorphs, asthenic, 107
  feet in, 143
  voice in, 166
Dominant, chemical-hormonic, 68
  endocrine, 94, 245
  nervous, 68
  neuro-endocrine, 65
Dopa reaction, 135, 136
Drop-heart, 109, 153, 154
Duodenal ulcer, 179
Dwarfism, 115, 125
Dynamic-endocrine criterion, 65
Dynamic-humoral aspect of constitution, 26, 56, 64
Dysbiligenesis, 185
Dyscrasia, humoral, 169
Dysgenesis, embryo-fetal, 217 *et seq.*
Dyshormonism, 126
Dyskinesia, 176, 181
Dysmenorrhea, 109, 163
  in arthritics, 101
  in hypogenital dolichomorphs, 109
Dyspepsia, functional, 175
  gastro-intestinal, 184
  in infantile arthritism, 101
Dyspituitarism, 193
Dysplastic type, 81, 85
Dysthyroidism, 136, 186, 219
Dystonia, gastric, 176
  intestinal, 181

E

Ectoderm, 130
Ectypes, local, 129
  megalosplanchnic hypervegetative, 88
  microsplanchnic hypovegetative, 103
  of Viola, 36
Eczema in arthritism, 101, 137
  recurrent, 185
Edema, 120
  angioneurotic, 167
  Quincke's, 167, 181
Educative moment, 238
Emphysema, 167
Endocrine glands, maternal, 241
  system, 210, 223, *et seq.*
  varieties, 65 *et seq.*
    hyperadrenal, 93, 234
    hypergenital, 87, 93, 206
    hyperpituitary, 93, 231
    hyperthymic, 87, 235
    hyperthyroid, 228
    hypoadrenal, 80, 233
    hypogenital, 87, 136, 199
    hypoparathyroid, 234
    hypopituitary, 232
    hypothyroid, 91, 136, 230
Endocrinopathies, familial, 224
Endocrinotherapy, 240, 241
Energy of nervous reactions, 245
Endogenism, vii
Enteroptosis, 182 *et seq.*, 215
Enuresis, 163, 164, 197, 213, 214
Environment, relation of, to constitution, 24
Eosinophilia, 102, 120, 131, 149

- Epilepsy, 185, 212, 217, 219
- Epileptic character, analogous to spasmophilia, 77
- Epithelium, renal, 191, 193
- Epistaxis, 185
  - in infantile arthritism, 100
- Equilibrium, endocrine-sympathetic, 95
  - functional, 240
  - general dynamic, 33
  - interorganic, 18
  - ionic, 70, 247
  - neuro-vegetative, 166, 245
  - of right and left heart, 61
  - trophic, 240
- Erben's reflex, 71
- Erethism of animal nervous system, 114
- Ergotamin, effects of, 71
- Erythremia, 147
- Erythrocytes, 151
  - in urine, 193
- Erythrocytosis, 147
- Erythropenia, 147, 148
- Erythrism in dolichomorphs, 107
- Esophagus, 173
- Eugenics, 241
- Eumorphs, 36, 46, 56, 245
- Eunuchoidism, 106, 109, 138, 143, 148, 149, 165, 199, 200, 215
- Eurhythmic proportions, 49, 50
- Exogenism, vii
- Exophthalmos, 163

F

- Fat, 141, 205, 233
  - phosphoric, 241
- Fecundity, 205
- Fetal glands, maternal influence upon, 226
- Flaccid type, 92, 93
- Flatfoot, 143
- Flatulence, 183
- Flavism, 136
  - in dolichomorphs, 107
- Flora, intestinal, 182
- Fluctuant variability, 28
- Forel's blastophthoric actions, 24
- Formula, constitutional, 242
  - endocrine, 245, 246
- Fractures, tendency to, 143
- Freckles, 135
- French morphological school, 86
- Freund's sign, 168, 169
- Friedrich's hereditary ataxia, 214, 217
- Frigidity, 109, 233
- Functional canons, need of, 34
  - economy, principle of, 239
    - in sexual expression, 240
- Furunculosis, 193

G

- Galactosuria, alimentary, 187
- Gall-bladder, 185, 186, 188
- Gaseous exchanges, 248
- Gastric anomalies, 173 *et seq.*
  - glands, 175
  - hypotonia, 180
  - juice, 174
  - ulcer, 114, 120, 178
- Gastroptosis, 179
- Gastro-succorrhea, 69
- Geigel's cardiac measurements, 57
- Genes, 237
- Genital apparatus, 199 *et seq.*
  - glands, 138, 188, 202, 207
  - hormones, 156
  - organs, 91, 207, 232, 233
- Genotype, 243, 244
- Geographic tongue, 101, 172, 173, 179
- Germ plasm, 20
- Geroderma, 136
- Gigantism, 49, 115, 127, 169, 224
- Glands. *See* Endocrine, Thyroid, etc.
- Glandular extracts, 240
- Glioma, cerebral, 217
- Gliosis, 131
- Glucose, elimination of, 193
- Glycemia, 67
- Glycemic curve, importance of, 67
- Glycosuria, 185
  - adrenalin, 70
  - alimentary, 185
  - emotional, 113
  - in arthritics, 101
  - psychic, 111
  - renal, without hyperglycemia, 193
- Godin's law of alternations, 36, 238
- Goiter, relation of, to erythrocytosis, 147
  - to myoma, 206
- Goose-flesh, 71
- Granulocytes, 148
  - importance of, 63
  - neutrophile, 149
- Growth, alternation of, phases of, 36
  - hypertrophy, 110, 156, 158
- Gymnastics, 238
- Gynecomastia, 205

H

- Habitus, apoplectic, 94, 221, 222
  - asthenic, 87, 103, 108, 233
  - atonic, 111
  - bilious, 185
  - brachymorphic, 230
  - dolichomorphic, 238
  - in peptic ulcer, 178
  - in renal weakness, 198
  - lymphatic, 179

Habitus, megalosplanchnic, 66, 198
  phthisic, 86, 103, 221, 222
  ptotic, 183
Hair, behavior of, 139, 140
  definitive, 203
  distribution of, 107
  in hypergenitals, 137
  in hyperpituitaries, 231
  in hyperthyroids, 229
  in hypopituitaries, 233
  in hypothyroids, 230
  in megalosplanchnics, 90
  in microsplanchnics, 104, 107
Head in hypothyroids, 230
  morphology of, 143
  skeletal analysis of, 143
Headache, 231
Heart, drop-heart, 109, 153, 154
  growth of, 60
  has own constitution, 61
  hypertrophy of, 158
  hypoplastic, 235
  in dolichomorphs, 110
  in hyperadrenals, 93, 234
  in hyperpituitaries, 232
  in hyperthyroids, 229
  in hypoadrenals, 234
  in megalosplanchnics, 90, 94
  in microsplanchnics, 109, 110, 168
  infantile type of, 152 *et seq.*
  infantilism of, 151
  measurement of, 57 *et seq.*
  muscle changes in, 158
  two antithetic types of, 61
Hematopoietic organs, anomalies of, 147 *et seq.*
    hypofunction of, in cancer, 103
  tissues, 131
Hemodynamics, 61
Hemoglobin, 62, 108, 110, 149, 151, 241
Hemoglobinuria, 191
Hemohistioblasts, 150
Hemolymphopoietic apparatus, 47, 57
    two types of, 62
Hemorrhoids, endogenous disposition to, 157
  in arthritic microsplanchnics, 111
  in bilious constitution, 185
  in infantile arthritism, 101
Hepatic cell, insufficient functioning of, 185
  innervation, inadequacy of, 187
Heredity, glandular, 225 *et seq.*
  in tumors, 131
  laws governing, 20
  relation of, to constitution, 24
Heredo-syphilis, 226, 227
Heterochromia of iris, 29
Heterotopic cells, 219
Hormones, adrenal, 156, 166
  anomalies of, 223 *et seq.*
  coöperation of, with tonics, 240
Hormones, functional grouping of, 66
  genital, 156, 166
  hypophyseal, 156, 166
  interrelation of, with nervous system, 243
  parathyroid, 241
  parasympathetic, 181
  splenic, 147
  thyroid, 221
  Viola's principle of, 66
Hormonic influence, 20
Homosexuality, 120, 201, 203, 208
Humoral dominant, 64
  state, 169
Humors, ancient concept of four fundamental, 18
Hybridism, 20
Hydrophilia in exudative diathesis, 99
  of colloids, 247, 248
Hygiene, 236
  endocrine, 240
Hygromatosis, 131
Hyperadrenal constitution, 55, 66, 73, 93, 97, 127, 139, 140, 146, 156, 201, 206, 207, 208, 234, 247
Hyperbilirubinemia, 185
Hypercalcemia, 185
Hyperchlorhydria, 175 *et seq.*
Hypercholesterinemia, 156, 185, 186
Hyperevolutism, 33
  of brain, 220
    characteristics of, 47
  ontogenetic, 210
  phylogenetic, 210
  psychic, 79
Hypergenital constitution, 53, 55, 66, 93, 103, 134, 137, 142, 145, 147, 156, 199, 200, 206, 207, 247
Hyperglycemia, 185, 193, 229, 234
Hyperidrosis, 113, 138
Hyperinsulinism, 70
Hyperorchidism, 140, 144
Hyperpancreatic constitituion, 66
Hyperperistalsis, 179, 181, 185, 232
Hyperpigmentation, 74, 135, 136
Hyperpituitary constitution, 53, 65, 67, 79, 80, 81, 97, 107, 113, 114, 134, 137 *et seq.*, 143, 145, 146, 166, 169, 172, 207, 231, 247
Hyperplasia, lymphatic, 149
    familial, 151
  of granulocyte tissue, 149
  of hypophysis, 207
  of lymphatic apparatus, 34, 61, 63
  of thymus, 225
Hypersthenia, 248
Hypersthenic variety, megalosplanchnic, 93
    microsplanchnic, 87, 111
Hypersympathicotonia, 81
Hypertension, arterial, 33, 61
  vascular, 158

- Hyperthymic constitution, 65, 114, 120, 134, 140, 142, 144, 148, 154, 169, 201, 235
- Hyperthyroid constitution, 52, 65, 67, 73, 79, 81, 87, 107, 113, 114, 119, 120, 127, 135, 137, 139, 140, 141, 143, 145, 164, 166, 169, 179, 180, 185, 198, 203, 217, 220, 228–230, 247
- Hypertonia, arterial, 33
  - gastric, 174
  - of capillaries, 157
  - of cardiac muscle, 113, 158
  - of muscles, 234
  - relation of, to parathyroid glands, 145
- Hypertrichosis, 139, 234
- Hypertrophy, cardiac, 33
  - cerebral, 239
  - prostatic, 206
- Hypervagotonia, 73
- Hypervegetative type, 86
- Hypoadrenal constitution, 65, 66, 73, 81, 87, 93, 97, 108, 113, 114, 135, 136, 138, 148, 151, 169, 170, 172, 178, 185, 187, 207, 224, 247
- Hypochlorhydria, 69, 179
- Hypochondria, 81
- Hypochylia, 111, 148, 174, 179
- Hypoevolutism, characteristics of, 47, 48, 115 *et seq.*
  - chemical, 211
  - cutaneous, 134
  - hematic, 148
  - local and general, 33
  - morphologic, 88
  - nasal, 162
  - neuro-psychic, 214
  - of appendix, 182
  - of cardio-arterial system, 61, 108, 152
  - of psycho-sexuality, 202
  - of spinal cord, 217
  - ontogenetic, 210, 212
  - partial psychic, 74
  - phylogenetic, 210, 214
  - sexual, 81, 200
- Hypogenital constitution, 53, 66, 106, 109, 113, 114, 119, 134, 137 *et seq.*, 142 *et seq.*, 148, 151, 154, 158, 166, 169, 170, 178, 179, 199, 200, 202 *et seq.*, 219, 234
- Hypoglycemia, 110, 134, 231, 234
- Hypoidrosis, 138
- Hypoövarian constitution, 139, 144, 146, 157, 260
- Hypopancreatic constitution, 145, 234
- Hypoparathyroid constitution, 52, 66, 81, 99, 113, 114, 137, 138, 144, 145, 169, 178, 180, 234
- Hypophysis, alteration of, 122
  - lipoids of, 241
  - predominance of, 65
- Hypophysis, synergy with thyroid, 67
- Hypopinealism, 127
- Hypopituitary constitution, 54, 66, 67, 80, 81, 87, 92, 97, 108, 119, 134, 138, 140, 141, 144, 145, 148, 163, 201, 219, 224, 227, 232, 247
- Hypoplasia, gastric, 178
  - general constitutional, 81, 118
  - genital, 155, 233
  - in thymico-lymphatics, 97
  - of aorta, 154, 198
  - of blood, 63
  - of chromaffin tissue, 119
  - of heart, 60, 61, 148, 152, 239
  - of renal arteries, 192, 198
  - of teeth, 163
  - utero-ovarian, 139, 179, 204
- Hyposthenic type, brachymorphic, 87
- Hyposympathicotonia, 73
- Hypotension, arterial, 120, 185
  - from adrenalin, 70
  - habitual, 69
  - vascular, 158
- Hypothermia, 154, 185, 233
- Hypothymic constitution, 144, 145
- Hypothyroid constitution, 54, 67, 73, 87, 91, 92, 128, 134, 135, 137, 138, 141, 143 *et seq.*, 147, 170, 172, 199, 207, 217, 224, 226, 230, 231, 247
- Hypotonia, gastric, 180
  - of cardiac walls, 153
  - of diaphragm, 184
  - vagal, 180
- Hypotrichosis, 139
- Hypovagotonia, 69
- Hypovegetative type, 86
- Hysteria, 220

I

- Icterus, 131, 171
  - catarrhal, emotional, 188
  - hemolytic, 186
  - infectious, 185
- Imbalance, chemical, 20
  - endocrine-sympathetic, 102, 135, 188
  - evolutionary, 20
  - morphological, 20, 112
  - pluriglandular, 208
  - psychic, 20
  - thermic, 102
- Imbecility, 128
- Impuberism, 121
- Index, cardio-aortic, 154
  - hemoglobin, 148
- Individual hormonic formula, 240
  - somatic fate, 22
- Individuality differential, 19, 244
- Infantilism, 23, 49, 60, 115, 120 *et seq.*, 151, 154, 188, 195, 205, 212, 215

Insulin, 70
Intelligence, relation of, to constitution, 26, 216, 246
Interstitial cells, 47, 48
Intestine, anomalies of, 180 *et seq.*
  in dolichomorphs, 111
Iodine, 137, 241
Iron, 241
Ischemia in enteroptosis, 184
Iso-ionia between Ca and K, 99
Italian constitutional school, 86

J

Johannsen's phenotype, 21
Juvenilism, 121

K

Kidney, contracted, 157, 191
  miopragic, 198
Kidneys, 111, 198, 233
  anomalies of, 190 *et seq.*
  tuberculosis of, 114
Koch's bacillus, 96, 161, 170
Kyphosis, 105, 162

L

Langerhans' islands, 188
Larynx, 89, 165, 166
Laws of alternation, 238
Leukemia, 131, 148, 149, 179
Leukocytes, Brugsch's table of, 63
  infantile form of, 148
Leukocytosis, 147
Leukopenia from aolan injection, 134
Leukopoietic organs, 148
Leptoprosopia, 163
Libido, 202, 207
Lithiasis, hepatic, 188
  renal, 191
  uric, oxalic, 196
Livedo, 192
Liver, anomalies of, 184 *et seq.*
  inadequacy of, 239
  in megalosplanchnics, 91
  spots, 135, 185
Longilineal type, 36
Lordosis, 162, 191, 192, 203, 229
Lungs in megalosplanchnics, 90
  in microsplanchnics, 110, 111
  undernutrition of, 168, 169
Lutein, 241
Lymph, 63, 94
Lymphatism, a hypoplastic state, 118
  a stigma of hypoevolutism, 96
  constitutional, 170
  in hypothyroids, 92
  in vagotonic microsplanchnics, 113
  of genital organs, 205
  torpid tuberculosis in, 97, 169, 170
Lymphocytes, Brugsch's table of, 63
  functioning of, 170
Lymphocytosis, 120, 148, 149, 234
Lymphopoietic organs, 147 *et seq.*
Lymphosarcomatosis, 149

M

MacAuliffe's classification, 85 *et seq.*
Macroskelia, 201
Malpighian cells, 136
Mammary glands, 201, 205
Mandible, 104, 163, 231
Manic-depressive psychosis, 76, 212
Masturbation, 190, 202
Matronism, precocious, 207, 234
Maxilla, 162
Measurement of deviations, 29
Measurements of heart, Brugsch's, 57 *et seq.*
    Geigel's, 58
    Rossi's, 59
  of skeleton, 37
  tables of anthropometric, 38–42
    Berghinz's, 42
    Viola's, 38, 39
    Viola's and Fici's, 40, 41
Megacaryocytes, 150
Megalosomia, 55
Megalosplanchnic type, 56, 67, 88 *et seq.*
    an anabolic, 247
    arthritic diathesis in, 95, 96
    atonic and flaccid, 92
    autotoxemia in, 95
    blood in, 63
    bradytrophism of, 95, 248
    endocrine dominant of, 66
    exudative diathesis in, 97
    fundamental principle of, 95
    hypertonic and hypersthenic, 93
    hypervegetative character of, 49, 95
    impure varieties of, 66
    intestines in, 180
    lymphoid hyperplasia of, 91
    morphologically hypoevolute, 95
    organic immaturity of, 95
    predominance of vegetative life in, 95
    synonymous with brachymorphic, 56
Megalosplanchny, 66
Melancholia, 234
Melanoderma, 185

Menopause, 139
Menstruation, 206, 207, 208
Mercury, 137
Merycism, 173
Mesenchymal tissue, abiotrophy of, 118
    importance of, 47
    inadequacy of, 131
    persistence of, 48
Mesoderm, 131
Metabolism, accelerated, 112, 229
    basal, 67, 112, 229, 231, 232, 245
    bradytrophic, 94, 95
    calcium, 234
    carbohydrate, 187, 193
    cholesterin, 186
    in megalosplanchnics, 94, 95
    in microsplanchnics, 112
    lipoid, 125
    material, 246
    of matter and energy, 247
    protein, 136
    purin, 196
    sugar, 165
    uric acid, 197
Microcardia, 154
Microgyria, 212, 219
Micromyelia, 212
Microsomia, 49, 55, 125
Microsplanchnic type, 57, 65, 103
    a catabolic, 247
    analysis of segments in, 104 *et seq.*
    asthenic, 108, 198
    blood in, 63
    digestive apparatus in, 111
    endocrine formula of, 65
    hyperidrosis in, 138
    hypersthenic, 108
    hypovegetative, 49
    impure varieties of, 65
    morphological imbalance in, 112
    morphologically hyperevolute, 65
    nose in, 105
    predisposition of, to pulmonary tuberculosis, 110, 139 167 *et seq.*, 185
    profile in, 105
    pure, 113
    skin in, 138
    stomach in, 180
    synonymous with dolichomorphic, 57
        with hypovegetative, 49
    tachytrophism of, 95
    typhoid fever in, 111, 182
Migraine, 92, 185, 212, 216
Mineral elements, living, 241
Miosis, 69
Miopragia of digestive apparatus, 112
    of endocrine system, 123
Miopragia of endothelium, 156
    of intima, 155
    of kidneys, 198
    of thyroid, 157
    organic, 239
Mitral configuration, 152
Mixed types, 57
Moles, pigmented, 135, 234
    vascular, 136, 185
Mongolian spots, 135
Mongolism, 212
Morphogenesis, 66
Morphological aspect of constitution, 26, 47, 54, 56 *et seq.*, 64, 243, 245
Morphology, 46, 91, 246
Mors thymica, 97, 155
Muscles, anomalies of, 145
    cardiac, 113
    electric excitability of, 74
    endocrine types of, 230 *et seq.*
    in megalosplanchnics, 90, 93
    in microsplanchnics, 107, 108
    of limbs, 120
    skeletal, 90
    striped, 62, 68, 107
Muscular type, 85, 86
Musculo-skeletal apparatus, 57
    autochthonous characteristics of, 62
    effect of calcium upon, 241
    in brachymorphs, 90, 93
    in dolichomorphs, 107, 108
Myasthenia, 145
Mydriasis, 68
Myelodysplasia, 213, 214
Myocarditis, 159
Myoma, 206
Myxedema, 73, 161, 217, 225

N

NAILS, behavior of, 140
Nanism, 49, 126
Neck, 44
Neoplasms, in relation to hypergenitalism, 103
    of genital apparatus, 205
Nephritis, acute, 111
    chronic, 191
    interstitial, 194
    moles in, 135
Nephrolithiasis, 196
Nerves, glosso-pharyngeal, 164
    parasympathetic, 69
    sacral parasympathetic, 181
    sympathetic, 98, 113
Nervous dominant, 68
    system, 130, 175
        animal, 114
        anomalies of, 209 *et seq.*
        autonomic, 159, 221

Nervous system, extracardiac, 110
    gastric, 175
    parasympathetic, 72
    sympathetic, 72, 73
    vegetative, 114, 170, 195, 222
Neurasthenia, 114, 149, 215, 220, 221
Neurinomatosis, 131, 217
Neuro-chemical dominant, 64 *et seq.*
Neuro-chemism, 243, 247
Neuroglia, 47, 211
Neuro-endocrine mechanism, 25
    functional examination of, 64
    individual dominant, 65
    in fetal development, 124
    instability of, 25
Neuro-hypophysis, action of, upon uric acid, 197
    insufficiency of, 195
Neuro-psychic apparatus, 202
Neuro-psychasthenia, 220
Neurofibromatosis, 130
Neuroses, 178, 220, 221
    cardio-vascular, 158, 164
Neurotonus, 68 *et seq.*
    animal, 68, 74, 93
    vegetative, 68, 72 *et seq.*, 80
Neurovegetative influence, anabolic and catabolic, 20
Neutrophilia, 149
Normality, clinical not the same as statistical, 52
    differentiated from health, 50
Normosplanchny, 56
Normosplanchnic type, 67
Nose, 104, 111, 135, 143, 160 *et seq.*
Nystagmus, 217

O

Obesity, 67, 187, 224, 233
Ogival palate, 162, 217
Oligodipsia, 112
Oligo-hemia in hypothyroïds, 92
Oliguria, 196
Ontogenesis, 46, 83, 124
Ontogenetic law of Viola, 35, 36
Opotherapy, 240, 241
Optimism, 247, 248
Organic immaturity, 63
Organotherapy, 239
Orthovagotonia, 81
Osmotic power, 248
Osteogenesis imperfecta, 131
Ovaries, 103, 109, 128, 141, 225
Oxalaturia, 197
Oxaluria in arthritics, 101
Oxycephaly, 161
Oxygen, circulation of, 248
    pulmonary, 241
Oxyurides, 182

P

Pancreas, 137, 184, 188, 239
Paralysis agitans, 217
Parasympathetic system, 68, 69, 71, 72, 94, 99, 135, 215, 219, 222, 245
Parathyroid glands, 65, 145, 214, 226
Parenchymal tissue, 47
Paresis, juvenile, 212
Parotids, 173
Partial constitutions, autochthonous, 20
    correlative, 20
    Martius' concept of, 19 *et seq.*
    of organs, 19, 47, 95
Pediculosis, 137
Pelvis, 90, 109, 120, 203, 206, 207, 233, 235
Pende's trichographism, 71
Penis, 91, 92, 109, 203
Peritoneum, 183
Peristalsis, 113
Permeability of intestine for calcium, 197
    renal, 194
Personalism, vii
Perspiration, anomalies of, 138
Pessimism, 247
Phalanges, 108, 144
Pharmacodynamic tests, 69, 70, 178
Pharyngeal tonsil, 160
Phenotype of Johannsen, 21
Phosphate ions, increase of, in hypoparathyroidism, 99
    intracutaneous effect of, 134
Phosphaturia, 101, 111, 197
Phosphorus, 241
Phylogenesis, 153
Pigmentation, 135, 231
Pilocarpine, intracutaneous effect of, 69, 134
Pineal gland, 98, 128, 200
Placenta, 241
Pituitrin, 72
Platelets, 147, 150
Plethora, hematic, 149
    nutritive, of an organ, 48
Pollakiuria, 197
Polycythemia, 91, 147
Polynucleosis, 148
Polyuria, 70, 194, 195
Ponderal evolution, 35, 66
Potassium, 99, 134
Prediabetic states, 137
Predisposition, inseparable from condition, 25
Premature aging, 137, 144, 157, 199, 216, 231
Prenatal care, 241
Progeria, 126
Prognathism, 162
Proliferation of connective tissue, 131

Prophylaxis, individual, 238
    social, 236
Prostatic hypertrophy, 205, 206
Protein shock, 187
Proteins, 149
Protoplasm, 247
Pseudo-hermaphroditism, 201
Pseudo-leukemia, 131
Pseudo-lipomata, 141
Psychasthenia, 185, 220
Psyche, 75, 210, 227, 231, 234
Psychic trauma during pregnancy, 227
Psychical aspect of constitution, 20, 26, 56, 74 *et seq.*
Psychogram, 34
Psychoses, 75, 222
Puberism, persistent, 121
Puberty, 75, 76, 109, 124, 126, 199, 202, 238, 239
Pygmeism, 125
Pyknic type, 62, 80, 85, 86, 94
Pylorus, 176, 177, 179, 180
Pyorrhea, 164
Pyramid, triangular, of constitution, 26, 84, 243
Pyramidal tracts, 212, 214
Pyrosis, 175

Q

Quetelet-Gauss, binomial law of, 27
Quincke's disease, 101
    edema, 167, 181

R

Radium, 240
Rautmann's anthropometric tables, 45
Reëducation of organs, 238
Reflex, Babinski, 215
    conjunctival, 219
    Erben's, 71
    Löwi's, 71
    nasocardiac, 164
    oculo-cardiac, 164, 219
    pharyngeal, 219
    pilomotor, 71
    pseudo-Babinski, 215
    Ruggeri's, 72
    Somagyi's, 71
    tendon, 219
    vagal, 221
Reserve nutritive material, 248
Respiratory apparatus, anomalies of, 160 *et seq.*
        in dolichomorphs, 110
Responsivity, 54
Reticulo-endothelial tissue, 131, 151, 170, 186
Rheumatism, 33, 185, 207
Rhinitis, 167
Rhinopharyngitis in arthritics, 100
Rhythm, 246
Ribs, 106
Rickets, 143, 161, 215, 234
Roentgen-rays, 142, 240
Rossi's measurements, 59
Rumination, 173
Rutilism, 136

S

Sadism, 203
Salivary glands, 173
Sarcoplasm, 215
Schizoid character, 247
Schizophrenia, 114, 149
Schizothymic constitution, 76, 193, 219
Schwann's sheaths, 214
Sclerosis in arthritics, 95
    of Ammon's horns, 219
    of liver, 239
    of nervous system, 217
    of renal arteries, 198
    multiple, 218
    premature, of aorta, 154
    syphilitic, in fetal glands, 226
    tuberous, 218
Scoliosis, 162
Sebaceous glands, 138, 231
Seborrhea in hypergenitalism, 138
    in hyperpituitarism, 231
Semiological criterion of constitution, 56
Semiology, 242, 245, 246
Semon's engraphia or somatic induction, 24
Senilism, juvenile, 137
Senility, 207, 240
Septum, nasal, 160
Sergent's white line, 72
Serial frequency curve, 27, 34, 54
Sexual apparatus, anomalies of, 199
        importance of studying, 57, 63, 64
    characteristics, secondary, 91, 93, 206, 233
    development in brachymorphs, 91
        in dolichomorphs, 109, 169
    differentiation, psychic, 74
    function in relation to thyroid exhaustion, 240
    hypoplasia, 199
Sigaud's classification, 85
Skeleton, endocrine types of, 143
    in hyperpituitarism, 231
    in hypopituitarism, 233
    in megalosplanchnics, 89, 90
    in microsplanchnics, 107
    in senile nanism, 126
    measurements of, 37

Skeleto-muscular system, 142
        anomalies of, 142 *et seq.*
        in megalosplanchnics, 90
        in microsplanchnics, 108
Skin, anomalies of, 133 *et seq.*
    as index of humoral state, 134
    as regulator of trophism, 133
    at puberty, 134
    functions of, 133
    in hyperpituitaries, 231
    in hyperthyroids, 229
    in hypothyroids, 230
    in lymphatic subjects, 134
    in megalosplanchnics, 90
    juvenility of, 137
    pigmentation of, 135
Skull, 85, 86, 104, 126, 143
Sleep, 216, 219
Social medicine, 236
Soma, correlation of, with psyche, 81
Spasmophilia, analogous to epilepsy, 77
    gastric, 173
    how revealed, 215
    in hypoparathyroids, 145, 214, 234
    in infantile arthritism, 102
    of microsplanchnics, 113
    of vesical muscles, 197
    relation of, to epilepsy, 219
    vagotonic orientation of, 170
Spasmophilic type, 66
Specific dynamic action of food, 67
Spinal cord, 212 *et seq.*
Spleen, 91, 151, 186
    anomalies of, 184, 189
Splenomegaly, 131, 151, 189
Stasis, hemorrhoidal, *et al.*, 184
    intestinal, 233
    lymphatic, 61, 157, 172, 230
Stature, 43, 44, 89, 93, 126, 128, 231
Status chloroticus, 225
    degenerativus, 115 *et seq.*, 135, 148, 241
    hypoplasticus, 117 *et seq.*, 189, 218
    lymphaticus, 120, 164, 188, 189
    thymico-lymphaticus, 97, 118 *et seq.*, 149, 152, 155, 192, 215
    thymicus, 52, 145, 225
Stenosis, aortic, 60, 154
    congenital mitral, 227
    naso-pharyngeal, 160
    of air-passages, 160
Sternum, 90
Stigmata, degenerative, 152, 173, 192
    of brain, 213
    in epileptics, 218
    infantilistic, 216
    morphological, 81, 117
    of general constitution, 217
    of nervous system, 209
    vagotonic, 113, 178
Stiler's asthenic type, 88, 134, 148, 178
Stimuli, abnormal, 239
Stimuli, endogenous, 22
    exogenous, 20
    physiological, 31
Stomach, anomalies of, 174 *et seq.*
    in hyperthyroids, 229
    in hypothyroids, 231
    in megalosplanchnics, 91, 174
    in microsplanchnics, 111, 178
Strangury, 197
Subcutaneous tissue, 141
Suprarenal glands, 65
Surface tension, 248
Sympathetic system, 68, 72, 73, 74, 110, 113, 167, 174, 176, 180, 215, 221, 224
Sympathicotonia, diagnosis of, 68, 69
    in determination of biotype, 245
    in the phthisic habitus, 222
    of pure microsplanchnics, 113
    reflex from calcium, 134
Sympathicotonics, dry mouth of, 173
    emotions in, 83
Syphilis, congenital, 212
    effect of, on fetal glands, 226, 227
    infantile, 125
    of aorta, 157
Syncope, 192
Syndactylia, 213
Synergy of gastric nerves, 176
Syringomyelia, 218

T

Tabes, 114
Tabetics, 146, 213, 214, 217
Tachycardia, 113, 219, 229
Tachypragia, 74, 114, 230, 246
Tandler's concept of constitution, 25, 124, 244
Teeth, 105, 138, 143, 144, 145, 231, 233
Temperament, ancient concept of, 243
    bilious, 184
    coupled with constitution, 18
    cyclothymic, 77
    definition of, 18, 25
    hypogenital, 200, 201
    hysterical, 216
    included in constitution, 25
    neurasthenic, 221
    psychic, 75
    schizoid, 77
    scizothymic, 114, 201
Testicles, 141, 203, 205, 208
Tetany, 215
Thermogenesis, 112
Thorax, anomalies of, 167
    brachymorphic, 90
    dolichomorphic, 106, 110
    hypertrichosis of, 140
    in adenoidism, 161 *et seq.*
    in tuberculosis, 168

Thorax, male, 140, 203
    measurements of, 37, 45
    paralytic, 168
    pyriform, 184
    skin of, 137
    types of, 87
Threshold of glucose elimination, 193
    of water elimination, 195
Thrombocytosis, 147, 150
Thrombophilia, 150
Thrombopenia, 150, 155
Thymus, 97, 98, 117, 118, 119, 127, 134, 225
Thyroid, atrophic, 188
    gland, 141, 224, 225
    in elimination, 197
    insufficiency of, 200, 201
    predominance in microsplanchnics, 65
    synergy with hypophysis, 67
Tongue, 96, 172
Tonics as endocrine stimulants, 240
Tonsil, pharyngeal, 161 *et seq.*
Tonsils, 66, 96, 181
Tonsillitis, 100
Tonus, muscular, 68, 146
    neuro-vegetative, 70, 197
    of arterial walls, 156
    of bodily form, 245
    of cardiac walls, 158
    of gastric walls, 174
    of tissues, 64
    of vegetative nervous centers, 70, 71
    parasympathetic, 98, 120, 164, 197
    sympathetic, 74, 98, 197
    vagal, 74, 177
Tower skull, 140, 143
Trichogenesis in dolichomorphs, 107, 168
Trigeminus, 164
Trophedema, 92
Trophism in megalosplanchnics, 95
    of hair and scalp, 138
    of muscles of stomach, 180
    of tissues, 178
Trophoneurosis, 178
Trunk, fat of, 141
    in megalosplanchnics, 89, 90
    in microsplanchnics, 103, 106, 107, 233
    value, 43
Tuberculosis, aphonia preceding, 165
    in hyperthymics, 235
    in megalosplanchnics, 96, 97
    intestinal, 182
    latent, 31
    maternal, effect of, on fetus, 226
    pilar disharmony in, 116
    pulmonary, dolichomorphic predisposition to, 47, 87, 110, 114, 168, 169, 185, 205
Tuberculosis, pulmonary, freckles in, 135
        moles preceding, 135, 136
        without bronchitis, 167
    with aortic stenosis, 155
        deviation of septum, 160
Tumors, familial dispositions to, 131, 132
    of genital apparatus, 205
Turgor vitalis, 73, 79, 248
Typhlomegaly, 183
Typhoid fever in microsplanchnics, 111

U

Ulcer, duodenal, 114, 179
    gastric, 114, 178
    round, 175
Unipolar variability, 28
Uricemia, 187
Uricemic fever in exudative diathesis, 101
Urea, elimination of, 193
Uric acid, elimination of, 197, 233
Urination, anomalies of, 197
Urine, calcium in, 197, 230
    concentration of, 194
    oxalic acid in, 197
    spastic, 195
Urticaria, 74, 100
    in arthritism, 100
Utero-ovarian hypoplasia, 179, 203, 206
Uterus, anomalies of, 199 *et seq.*
    hypoplastic, 205
    in dolichomorphs, 109
    myomatous, 206

V

Vagotonia, a degenerative stigma, 151
    constitutional, 102, 164, 165, 188, 215
    effect of, on character, 81
    gastro-intestinal, 173
    in asthenic microsplanchnics, 113
    in constitutional albuminuria, 192
    in epileptics, 218
    in relation to pulmonary lesions, 170
    intestinal, 183
    renal, 193
Vagotonics, emotions in, 83
    urogenital anomalies in, 197
Vagus, 70, 176, 177, 231
Valvular endocarditis in megalosplanchnics, 159
Variability of determined characteristics, 28
    measure of, 28, 29
Varicose veins, 157

Vascular influence, 20
Vasomotor influence, 20
    phenomena, 221, 229, 231
Vegetative nervous system, 35, 48, 220, 232, 245
Velocity of functional reactions, 246
Venetian population, measurements of, 33, 38, 40
Vertigo, 192
Viola's anthropometric procedure, 37
    ontogenetic law, 35, 36, 46, 57, 66, 84, 245
Vitiligo, 136
Vocal cords, 166
Voice, endocrine varieties of, 166

W

Water, avidity of tissues for, 194
    elimination of, 190, 194, 233
    retention of, 112, 231
Weight, 35, 44, 66, 112
    variations in, 112
Worms, tendency to, 182

X

Xanthoma, 185

Z

Zygomata, 104, 105

P8-CUU-056